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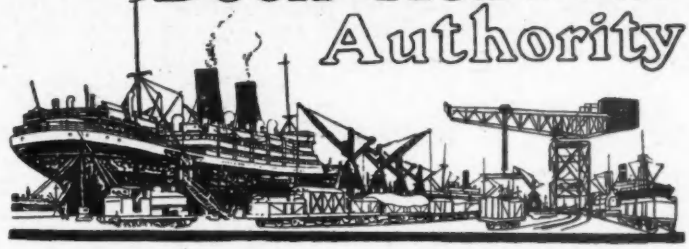

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Editorial Comments

Liverpool Lock Reconstruction.

The devastation inflicted on dock and harbour installations in Great Britain, no less than on the Continent of Europe, has been sufficiently conspicuous to need no amplification of descriptive mention to convince anyone of its widespread character and reality, and the work of reparation and reinstatement has correspondingly involved much expenditure with many constructional problems. One of the most striking cases from an engineering point of view is that of the Gladstone-Hornby Lock at the north end of the Liverpool Dock System, where a particularly vulnerable section was temporarily put out of commission by bomb action.

Through the courtesy of Mr. Leopold Leighton, the Engineer-in-Chief of the Mersey Docks and Harbour Board, we are enabled to present in this issue from the pen of Mr. D. G. Braid, the Assistant Resident Engineer on the reconstructional work, an account of the steps taken to deal with an operation of some exceptional intricacy and difficulty.

Perhaps the most interesting feature of the undertaking was the method adopted for securing in position with adequate security the extremely complex arrangement of shoring king piles and walings required for the formation of a dam at the south end of the lock, and, in particular, the novel connection between the timber work and the steel girders which were employed for the purpose of supporting the outer sheet piling.

The ingenuity and skill with which a difficult operation was performed is deserving of every commendation, and both Mr. Leighton and his assistant are to be complimented on the satisfactory solution of a problem of so complex a nature.

Cargo-Handling Methods.

One of the chief problems closely connected with the speedier turn-round of shipping is that of providing quicker and more efficient cargo-handling methods. This subject, which has been frequently referred to in these columns, is not limited to any particular country, and must continue to engage the attention of port officials, stevedores and shipping companies throughout the world. There does not appear, however, to have been any systematic investigation in this country or any concerted effort to analyse ship loading and discharging costs by an organised programme of comparative observation and research.

In contrast, ports in the United States are keenly alive to the advantages to be gained by a careful study of the subject, and during the last year or two, the Port Development Branch of the Research Division, United States Maritime Commission, has been analysing statistical data obtained from specific ports, by means of a study of actual costs based on a man-hour or gang-hour basis. It is claimed that, as a result, means of improvement in operational methods have been found and appreciable savings in costs have been effected in spite of a general increase in wages.

We are indebted to Colonel H. Butler, Chief of the Research Division of the United States Maritime Commission, and to Mr. R. I. Schneider, Acting Chief of the Port Development Branch, for permission to reproduce the interesting Paper on "Recent Developments in Cargo Handling Efficiency" which will be found elsewhere in this issue. The Paper gives details of the practical approach which has been made to the problem and we commend it to our readers as deserving careful study.

The Embargo on Port Development Works.

In addition to the need for improved cargo-handling methods, there is, at many ports, a further need for dock and berthage accommodation and for the provision of new equipment. The recent embargo on development works has, therefore, caused embarrassment to a number of port authorities who have prepared essential construction or rehabilitation schemes and have started to carry them into effect. Already, since the veto was imposed, several ports have made representations to the Government at being refused permission to proceed with their plans, and dissatisfaction at the present position has been expressed. Space does not permit reference in detail to the many cases that could be quoted, but two outstanding examples can be found in the Ports of Leith and Hull.

The Minister of Transport recently announced that in accordance with the recommendations of the White Paper on capital investment, work on the Leith Docks extension scheme, scheduled to cost £600,000, was to be discontinued on the 1st March, but at the same time, indicated that if for technical or safety reasons, it is considered that certain work should be continued beyond that date, the Commissioners should so inform the Ministry. This they did, and consultation with the Ministry's technical advisers is now awaited.

It is held by the Commissioners that unless the Government allow the work to be continued until it has reached the stage when there will be no risk of accident or deterioration, the capital expenditure already incurred, amounting to about £160,000, will, be, to a large extent, wasted. They point out that the essential materials actually on the job are sufficient to keep the work going for at

Editorial Comments—continued

least nine months, and that a suspension of the scheme will not only involve great loss financially, but will hold up work of great importance to Leith and to the country generally.

In the case of Hull, where plans for dock reconstruction and improvement have also been deferred, meetings have been held between the Hull Chamber of Commerce and Shipping, Railway officials and the local Members of Parliament to consider what steps could be taken to lift the embargo in so far as the extension of the King George Dock and the rebuilding of the Riverside Quay was concerned. The suggestion has been put forward that the Government should be urged to differentiate between capital expenditure on new projects and capital expenditure on war damage replacements. The rebuilding of Riverside Quay, coming in the latter category, would be helpful in providing additional berths.

Everyone knows there are very good reasons for the Government's decision to ban all new development works, but in those cases where the work consists chiefly of war damage repairs, or where considerable progress has been made on schemes already approved, we suggest a sudden cessation of this much-needed work will prove a serious handicap to efficient port working. This will still further impede the efforts that are being made to provide adequate facilities and bring about more efficient cargo handling methods in order to promote the speedier turn-round of shipping.

Theft and Pilferage at Ports.

A matter that has been causing dock and harbour authorities considerable concern for a long time, and increasingly so during recent months, is the difficulty of successfully combating the incidence of theft and pilferage which, since the end of the recent war, has developed to an alarming degree at the ports of this country, and indeed at all ports throughout the world. This problem, which has been frequently discussed in these columns, seems to become increasingly difficult to solve as the years go by, for as fast as new methods of prevention or detection are adopted, so the thieves contrive new and ingenious methods to circumvent the police and port officials.

The evil has now become a national menace, and is so serious in its ramifications that it is only by a concerted effort on the part of shipowners, stevedores, port officials, road transport, rail and commercial interests and the police that a possible solution can be found. New methods of dealing with the problem were suggested by Mr. H. H. Mummery in a Paper he read before the Liverpool Branch of the Institute of Export at the end of January last. The address, which will be found in abridged form elsewhere in this issue, contains some constructive suggestions, and recommends a positive line of action that is worthy of the most careful consideration. His chief recommendation, to organise a system of checking goods at all transit points from the shippers to the consignees' warehouses, would undoubtedly determine at what stage in the journey most thefts take place, so that the necessary preventive action could be taken in the future, but at the same time such a scheme would be very costly to run. The experiment is, however, certainly worth trying.

Mr. Mummery's second point, that there should be a pooling of ideas by representatives of the various interested parties, has already been carried into effect. A representative conference was held at the offices of the London Chamber of Commerce as recently as the middle of last month and it was decided that a small committee should be set up to co-ordinate the activities of the various organisations. At that meeting, the Chairman emphasised that pilferage is not peculiar to this country, and said that as far as could be judged, losses elsewhere were much greater than in Britain. Be that as it may, the losses in this country are undoubtedly serious and port authorities, in particular, will watch with the greatest interest the outcome of the action that has now been agreed.

Meanwhile, there are indications that the steps already being taken at some of our major ports are having a beneficial effect. The Port of London Authority are succeeding in reducing petty pilferage at the port, due chiefly to recent heavy penalties imposed on the seamen and dockers concerned, and also to the recruitment of younger police to replace the older men who carried on through the war. Another instance is the recent announcement by the Belfast Harbour Board that the Trade Unions at the port have decided to expel from the Unions dock labourers who are convicted of theft. This drastic measure will do more than any number of court actions to stop pilfering at the docks.

Port of Glasgow Trade Enquiry.

For some months past, complaints have been expressed by Scottish interests about the fall in the volume of trade handled at the Port of Glasgow. This has been the subject of close attention by the Clyde Navigation Trust, and a sub-committee on trade development investigating the position a few weeks ago reported that "while there has been no deliberate discrimination against the port, certain ocean-going ships with sufficient cargo to justify discharge at Glasgow have, in fact, discharged at other ports, the cargo being sent to Glasgow overland or by coaster, and reaching its destination later, less conveniently and less economically than it would be done had the cargo been discharged from the ocean ship in Glasgow, where she called when light."

Following representations made to the Government, a deputation from the Clyde Navigation Trust met representatives of the Ministry of Transport and other Government departments during last month regarding the matter, and various proposals were made for the adjustment of practices which appeared to result in the Port of Glasgow losing trade which normally flowed through it before the war and which it appeared should be restored to it to the national advantage. The Clyde Navigation Trustees and the Government departments concerned agreed to follow up these proposals on lines discussed.

Subsequently, the matter was raised in Parliament by Mr. J. Rankin (Lab., Tradeston), who said that, although it was recognised that the world's trade had deteriorated, at the same time there was a fairly widespread feeling on the Clyde that the situation was largely due to bad organisation. Mr. Rankin then made suggestions to bring about an improvement, although, no doubt, most of his recommendations had already been considered by those engaged in the enquiry. We agree with his contention that shipowners and merchants should, wherever possible, get together in order to make the best use of shipping space; it is, however, difficult to see how his plan that cargoes should be allotted before shipment, could be made to work under peacetime conditions—especially where incoming cargoes are concerned.

It is gratifying to note that the recent prominence given to the subject is having a beneficial effect, and that some importers have already reported an improvement in trade statistics since the matter was first made public.

Foreign Shipping and Chinese River Ports.

There have been further developments regarding the ban imposed by the Chinese Government, whereby foreign shipping on the Yangtsze River has been prohibited under war-time agreements abrogating British and other extra territorial and navigation rights in China, and granting China the right to close any port to overseas shipping. Details of the dispute were given in our last issue and the hope was expressed that the misunderstandings on both sides would be removed so that trade could be resumed as quickly as possible.

Announcements in the Chinese press now state that the matter is being reviewed, and the Chinese Government is at present considering a conditional re-opening of some of the country's inland ports, to enable foreign shipping to carry relief goods from the United States to China, without incurring the delay which is imposed at present through the compulsory unloading of ships at Shanghai and the re-shipping of the goods into Chinese vessels for delivery inland. According to one report, the places where foreign vessels might unload, and the length of their stay at the inland ports, will be specified in each case by the Chinese Government. On their return voyage the vessels will probably carry Chinese exports such as tungsten and porcelain.

These indications that agreement will be reached are very welcome, and shipping circles especially will hope that the negotiations will speedily be brought to a successful conclusion.

Repairs to Gladstone-Hornby Lock, Port of Liverpool

With special reference to the Design and Erection of Coffer Dam

By D. G. BRAID, B.Sc. (Glas.), A.M.I.C.E.

Introduction

THE northern system of the Liverpool Docks, under the control of the Mersey Docks and Harbour Board, extends from the Sandon Half Tide Dock at the south to the Gladstone Dock at the north and includes the Sandon, Huskisson, Canada, Brocklebank, Langton, Alexandra, Hornby and Gladstone Docks, all of which are capable of accommodating large vessels. Ships can enter or leave these docks by the Sandon, Canada or Gladstone river entrances.

The Gladstone-Hornby Lock, as its name implies, is the connecting link between the Gladstone and Hornby Docks and is the subject of this descriptive article.

With this lock in commission, the river entrances are complementary, as ships using the Gladstone entrance can pass via the Gladstone-Hornby Lock to the intermediary docks and then, if necessary, leave from either of the other two river entrances or vice versa. It will, therefore, be realised that without this connecting link the value of the river entrances, especially the northern one, with its exceptional depth of water of 20-ft. at the lowest state of tides, is considerably reduced.

While being important during peace time, the beginning of the second World War increased its usefulness, as throughout the war, Gladstone Dock was used as a naval base for escort destroyers, etc. Access to and from this base at any time was, therefore, essential, and, even if Gladstone river entrance had been closed by enemy action, the alternative way through the Gladstone-Hornby Lock to the other river entrances provided alternative means of ingress and egress.

General Description

The construction of the lock was the first step in connection with the important Gladstone Dock works, and it was opened to traffic in 1927 on the completion of these works, which were delayed due to the incidence of the 1914-1918 war. The whole undertaking was designed and executed by direct labour by the staff of the Board's Engineer's Department.

The lock has a width of 89-ft. 3-in. and the sill is 10 feet below Liverpool Bay Datum, the length between the caisson checks at each end being 740 feet. Three pairs of mitring timber gates are provided, dividing the lock into compartments of 350 feet and 295 feet or 645 feet overall, to suit the size of passing ships. The gates are so designed as to maintain the water of the docks immediately south of the lock at a level of about 30 feet above Bay Datum, this water level being maintained by pumping, irrespective of the high water level in the river. The water level in the Gladstone Dock system varies by some 6 or 7 feet with the Spring and Neap High Water Levels in the river.

History of Damage

Since its opening, the lock, which is constructed in mass concrete, has had an uneventful history, no major repairs of any nature being required up to the outbreak of war. However, in the course of the enemy air raids on Liverpool, and in particular on the northern system of docks, the lock received considerable damage in 1940.

Visual inspection, coupled with divers' reports, revealed that over and above the obvious breach in the East Wall extensive repairs would be necessary to the lock floor and south sill (see Fig. 1). Evidently one or more bombs had struck the East Wall with such force that about 80-ft. of the wall had collapsed inwards, interfering with the movement of ships. Apart from the blocks of concrete brought down from the side wall, the damage was further extended by a delayed-action mine exploding below water and shattering part of the South Sill platform and lock floor.

Temporary Repair Measures

With all the evidence and relevant facts of the destruction collected, it was obvious that the lock would need to be completely emptied of water before permanent repairs could be executed. This would have meant the closing of the passage and the end of its important function in providing an alternative means of access to the impounded system.

Fig. 1.—Damage to Sill and East Wall.

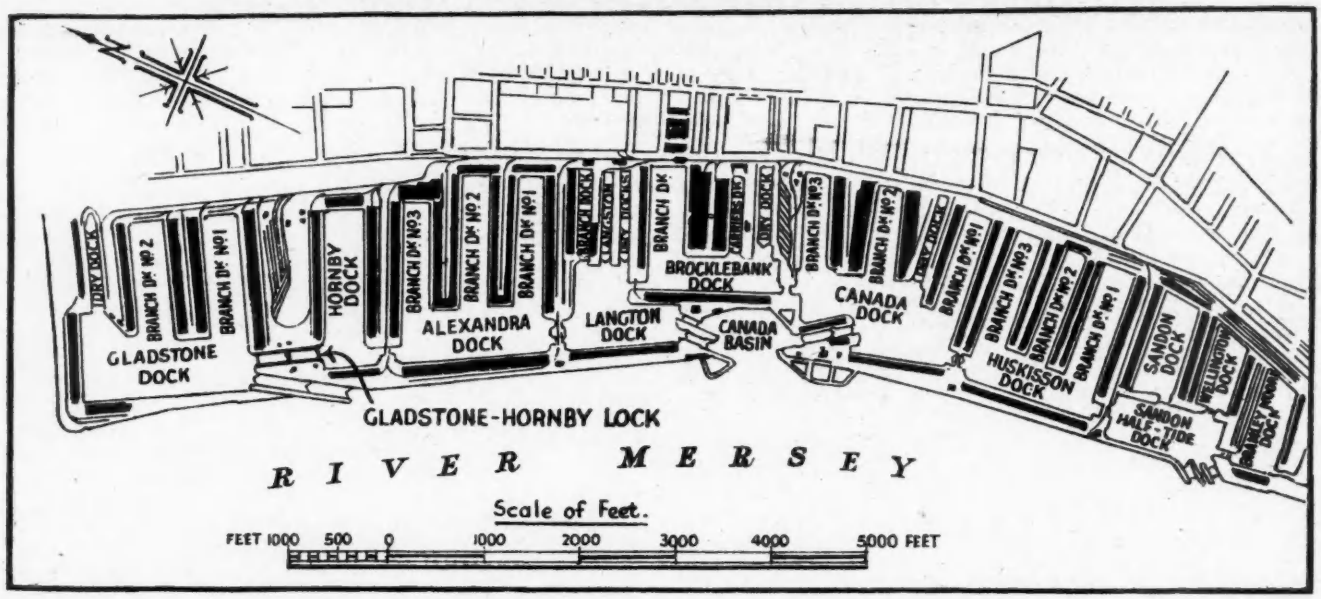
Immediate decision and action being imperative, divers of the Engineer's Department were given the dangerous task of clearing a passage for ships in the shortest possible time by working underwater amongst the debris. The clearing of massive concrete boulders is difficult and hazardous enough on dry land, where it is possible to study beforehand the possible effects of their removal on the rest of the loose debris. How difficult and hazardous it is below water can be imagined when it is realised that divers in 40-ft. of water are working in a complete black-out. However, such boulders that appeared stable were bound with wire ropes and then hauled to the surface by a 10-ton electric derrick crane. Sufficient debris was removed in this manner to allow the passage of medium sized ships, although there still remained a considerable amount of the shattered sections of the side wall on the lock floor so massive as to rule out the possibility of removing them by underwater work.

While this stop-gap work was in progress, the Engineer-in-Chief was considering a scheme to dry out the lock, remove the remaining debris, repair whatever was necessary, and again flood the lock.

As long as the Gladstone entrance remained undamaged, there was no reason (apart from some inconvenience to shipping) why the Gladstone-Hornby Lock should not be closed for a moderate period, but, on the other hand, if this main river entrance received similar attention from the enemy, then freedom of passage through the Gladstone-Hornby Lock was essential.

A simple scheme of closing the south pair of gates against the waters of the South Docks and placing a ship caisson in the caisson checks at the north end to retain the water in Gladstone Dock seemed to meet this important consideration.

Repairs to Gladstone-Hornby Lock—continued



Part of the Liverpool Docks System, showing the site of the Gladstone-Hornby Lock.

With this method the lock could be flooded at any time, the caisson removed and the gates opened, all within a few hours of receiving notice. There was, however, some element of risk attached to this scheme. What damage had the South Sill sustained? Was it strong enough to support the South Gates against the pressure of water from Hornby Dock? These questions could not be fully answered, as the top of the sill was hidden from examining divers by the shattered concrete of the collapsed quay wall.

The simplicity of the scheme justified this risk, and, even if the sill gave way during the de-watering operation or after, precautions could be taken to ensure that no great harm would occur.

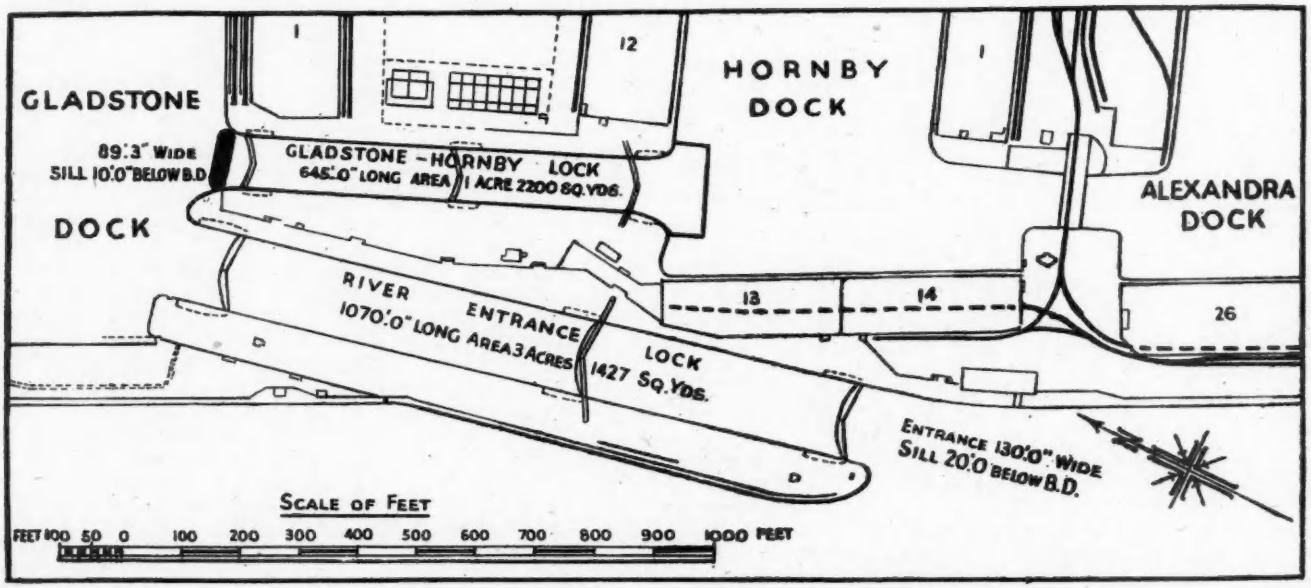
It should be mentioned here that the lock can be partially emptied by allowing the water to be run through under-water passages or culverts to the River Mersey when the tide is low.

Taking everything into consideration, it was decided to go ahead, and, with the caisson placed in checks at the Gladstone Dock end and the south gates closed, the water was gradually run off through the under-water culverts into the river. Everything seemed to be going to schedule, when it was noticed that water was entering the lock through the weakened sill at the south end. It was obviously inadvisable to proceed under the circumstances, as the sill might have given way completely. Work was stopped and the lock again refilled with water drawn from the Gladstone Dock.

With the passage being usable within limits, the wisest course now was to leave well alone until such time when the lock could be handed over to the Engineer's Department for complete and permanent repairs. Although this was not likely for a considerable time, work on preparing designs and drawings was commenced, as it was realised that the operation of de-watering the lock would be a major operation.

Preparations for Permanent Repairs

With the days of unlimited material and labour gone and the supply of any constructional medium difficult, and liable to continue so for some time, careful investigations were necessary to find the most suitable means of executing the work.


GLADSTONE
DOCK
89·3" WIDE
SILL 10·0" BELOW B.D.
GLADSTONE - HORNBY LOCK
645·0" LONG AREA 1 ACRE 2200 SQ.YDS.
HORNBY DOCK
ALEXANDRA DOCK
RIVER ENTRANCE LOCK
1070·0" LONG AREA 3 ACRES 1427 SQ.YDS.
ENTRANCE 130·0" WIDE
SILL 20·0" BELOW B.D.
SCALE OF FEET
FEET 100 50 0 100 200 300 400 500 600 700 800 900 1000 FEET

Plan of the Gladstone-Hornby Lock and River Entrance Lock.

Repairs to Gladstone-Hornby Lock—continued

The sealing of the north end with caisson checks, suitably spaced for the Board's 100 feet caissons, presented no difficulty (see Fig. 2). The south end was a different proposition, as the caisson checks had been constructed at 130-ft. centres and no caisson of such dimensions was available.

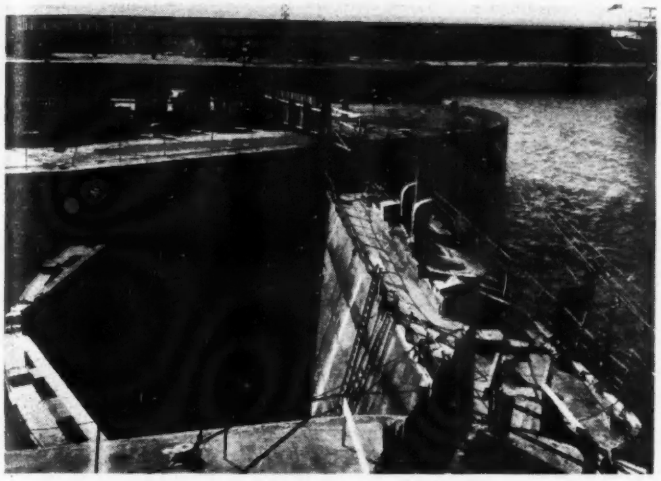


Fig. 2.—Sealing of North End of Lock with Ship Caisson.

A dam constructed across the South Bellmouth appeared, therefore, to be the only practical alternative (see Fig. 3). The depth of water at the south caisson sill is 48-ft. at spring tides and, with a minimum width of 150-ft., the pressure from the water was in the region of 5,000 tons, so that very considerable stresses were involved.

Preliminary designs indicated that a dam was a sound workable proposition and various designs were therefore prepared, with the following conditions in mind:—

(1) That the materials used in the dam construction should be suitable for use on other dams.
(2) The utmost economy in the use of materials should prevail, especially in the case of timber.
(3) That the arrangement of the structure should be similar to the well-tested arrangement as applied to previously constructed dams.
(4) The connections to be such that they could be made entirely under-water by divers with surety.
(5) That as far as possible the sections be prefabricated and that site work be reduced to a minimum.

Design of the Dam in General

Several designs were prepared and the dam, now completed, met all the conditions, as will be shown later. Generally speaking, the dam consists of steel sheet piling forming a watertight skin, supported by timber walings or ribs situated on the perimeter of the dam, which prevent the skin piles from buckling or distorting in a vertical direction. The walings receive their support from steel struts, which in their turn are stiffened to prevent buckling by steel columns or king piles (see Fig. 3). The walings, struts and king piles are all inter-connected and braced by steel lacings.

The dam shown in Fig. 3 is 150 feet wide on the south face and 60 feet wide at the two return sides, by 50 feet deep. The skin piles are supported by 12 tiers of walings ranging in size from 12-in. x 12-in. to 16-in. x 16-in. timbers, and the supporting steel struts—the longest of which is 85 feet—consist of two No. 12 x 3½ channels reinforced in their length with ⅜-in. thick steel batten plates. The king piles and lacings are rolled steel joists of 15-in. x 5-in. and 12-in. x 5-in. sections respectively.

The connections between the various members had to be simple, substantial and also foolproof. Structural steel connections, such as usually obtain on steelwork, were out of the question, yet the bulk of the material consisted of steel members meeting and crossing one another in several directions. Over and above this, the unusual requirement of steel struts butting on to timber walings added to the difficulty.

Fig. 4 illustrates the connection between the steel strut and the timber waling. Various ideas were examined but no satisfactory way of joining the steel directly to the timber was found, and the solution lay in fixing a short transition timber member, called by us " the bullet " (Fig. 5), into the heart of the strut. This reduced the problem to our usual arrangement of timber to timber and, therefore, our craftsmen and divers having ample experience of this arrangement, no difficulty was expected or encountered.

However, where the horizontal struts, vertical king piles and horizontal diagonal lacings met, no simple means of connecting them appeared possible. The connection had to be sound, yet at the same time considerable tolerance had to be allowed for irregularities in line and level. Eventually, the connection shown in Fig. 6 was evolved. In the steel strut a guide box was formed, which guided and prevented the steel king pile from twisting out of position, and a 2-in. diam. forged pin was inserted through both sides of the strut and through the web of the 15-in. x 5-in. joist king pile. Prefabricated brackets were bolted to the lacings, so that a box was formed when the lacings were placed on the struts, and, to make the connection, the divers were only required to fit timber blocks into the open ends and the connection was completed. By these means, the members were held in all directions.

So far most of the conditions had been met. Timber had been reduced to a minimum; the steel members were robust and capable of being used elsewhere on other dams; the connections were strong and easily formed under-water; and also most of the materials were ready for assembling on delivery to site.

Site Investigations

While it was being proved that the internal construction could be safely dealt with, investigations into the suitability of the dock bottom and quay walls for this type of dam were in progress.

From prickings of the dock bottom, it was found that the strata into which the piles would be driven was clay, soft on top and tending to harden at greater depths, which seemed to be suitable for the purpose.

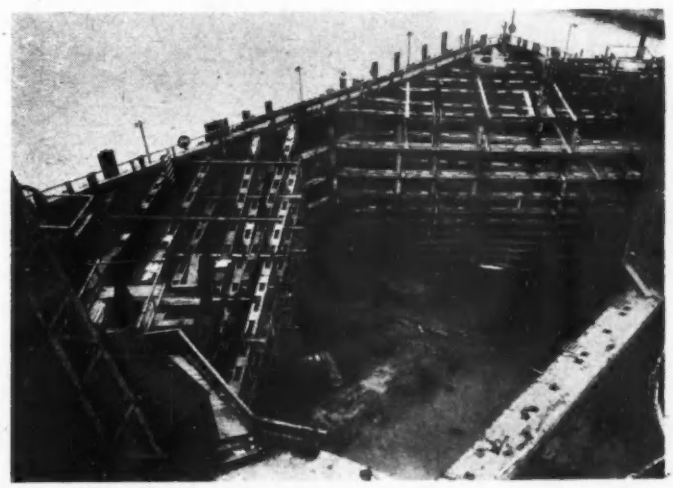


Fig. 3.—View of Dam Sealing, South End of Lock.

The side walls, which would support the sides of the dam, had now to be examined, as the full force of the water was transmitted on to them via the internal structure.

With the depth of the dam provisionally fixed at 16-ft. below Liverpool Bay Datum (L.B.D.), the bottom frame of walings and struts were therefore also located at this level. This being so, it was essential that the quay walls should be founded at a

Repairs to Gladstone-Hornby Lock—continued

considerable depth below this level, or the water would in all probability find its way round the sides of the dam and under the walls, with disastrous results.

The suitability of the West Wall was easily settled, as the progress drawings revealed that this wall had been founded at a depth of —26 L.B.D. and continued round from the lock wall beyond the sides of the dam. Careful examination of the wall by divers confirmed this. Information about the return of the East Lock wall was scanty and details of the junction of the Hornby Lock wall with the Hornby North Dock wall was incomplete. The Hornby Dock wall was built previous to the Hornby passage and also its foundations were founded at only —7 L.B.D., 9 feet above the level of the dam. Here, obviously, was a danger spot! However, by divers carefully examining the wall, the junction was eventually located at a position which was suitable for requirements, in so far as to give a solid foundation for the thrusting action of the walings.

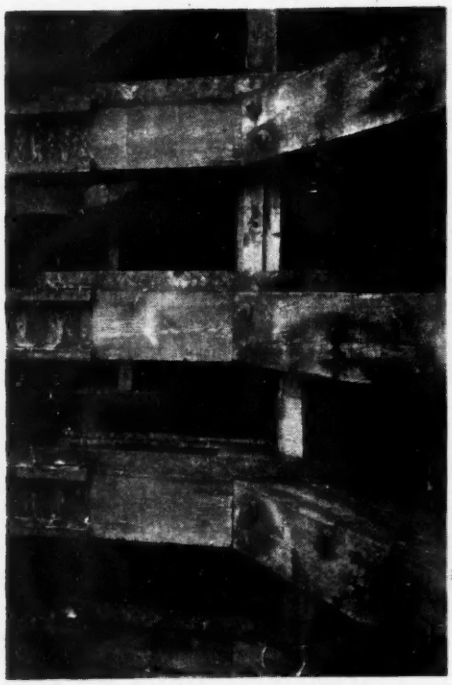


Fig. 4.—View Showing Connection between Steel Strut and Timber Waling.

Fig. 5.—View showing "Bullet" and Strut Connection. The Struts in this photograph thrust on to the Lock Wall at Caisson Checks.

Fig. 6.—View showing King Pile Struts and Lacing Connections.

Unfortunately, unlike the last wall, the outline or profile was anything but ideal, as it was most irregular and promised to be a source of trouble during the construction. Incidentally, it fulfilled its promise!

While this completed all the preliminary investigations necessary at the dam location, there still remained the question of the stability of the lock walls during dried out conditions.

Relieving the Quay Walls

The strength of gravity quay retaining walls lies in their weight, as it is their weight which supports the earth unnaturally banked up behind them. Obviously, the conditions which prevail when there is water on one side and earth on the other are vastly different from the condition with earth only acting on one side. During the first, there is to a great extent a state of balance which is partially lost when the water is removed.

Calculations into the stability of walls during the dry period, when reconstruction would be in progress, tended to show that the walls were not quite heavy enough to withstand the weight of the earth together with the probable unusual loads from the special plant required for the work. It was, therefore, decided to remove some of the earth from the landside of the walls, to make sure that there would be no tendency to move or slide. Fig. 7 shows the excavations for this purpose at the back of the walls.

Site Construction: Temporary Works

With certain areas and shed space allocated to the Engineer's Department, the erection of temporary works commenced. The site was completely fenced in, offices for technical staff and foreman prepared, electrical transformer station installed and tool and plant stores, together with canteen and first aid huts, erected. Two 10-ton electric derrick cranes were also erected on the East and West Walls of the South Bellmouth.

Dredging

It will be remembered that the prickings in the region of the dam revealed that the strata consisted of clay, soft on the top and tending to harden at greater depths. To ensure that the bottom of the dam would be level and the clay firm enough to grip the skin piles, the top layer of clay was dredged to a level of —16 L.B.D.

Pre-Assembly of Frames

The timber for the walings and the prefabricated steel struts having been delivered, the top frame of walings and struts was then assembled in the adjacent dock shed, all holes drilled, connections made, straining pieces fitted and erection marks given to each member. This was done to ensure that no mistakes would occur during under-water assembly.

One of the main functions of this frame being a guide for the skin piles during driving, the position of each pile was inscribed on the timber walings and numbered in accordance with the numbers already given to the actual piles.

It will, therefore, be seen that every article of construction, whether it was waling, strut or skin pile, had its position specified in the completed structure before any under-water work was commenced. This system was applied throughout and thus practically guaranteed no mistakes during erection.

The belt system as used in mass production was also employed with a high degree of success. With the assembly of one frame completed, checked and passed out to the divers, another frame was being pre-assembled. A steady flow of members from the stock yard to the assembly shed, and finally to the dam, continued throughout the job.

Repairs to Gladstone-Hornby Lock—continued

Dam Construction: Internal Bracing

With the preliminary assembly of the top frame checked, it was then built just over the water level in the dock in its final position and temporarily supported by skin piles spaced out along the perimeter at their pre-assigned positions. Great care was taken with the line level and square of this frame, as it acted as a pattern for the remainder of the frames built under-water.

With a proportion of the skin piles then driven, the real work of internally bracing the dam now commenced. Working from the lowest frame upwards, all the members of No. 12 frame were assembled under-water, the walings being attached to the piles with bolts passing through the timbers into pre-drilled holes in the skin piles and the struts, being made of steel, simply lowered through the water into prepared slots in the walings. Each member of the lower frames had to be vertically below their corresponding member in the top frame and, although this was more or less certain, due to pre-assembly, the position of each member was checked by dropping the king piles through their guide boxes in the top frames and testing to see if they would pass freely through all the guide boxes in the lower frames.

When all the walings and struts of all the twelve frames were fixed, the king piles or steel columns were then dropped through their strut guide boxes and driven to a specified level. Holes for the 2-in. diam. pins were pre-drilled in these piles, and, with the driving carefully executed, no difficulty was encountered in making the pin connection.

The attaching of the lacings also presented no difficulty, these being simply dropped into position, wedges placed in the automatically formed boxes and driven tight by divers.

Dam Construction: Piling

As previously mentioned, a proportion of the skin piling was driven in the early stages of the dam construction. With the clay firm and stiff and considerable resistance to driving expected, McKiernan-Terry hammers, Type 9 B.2, were used, with cast steel helmets placed between the hammer and pile to avoid damage to the heads of the piles. The type of piling used has a " Z " section with a clutch at one end and a tongue at the other. The clutch was always passed over the tongue, never the tongue through the clutch, when stepping the piles, in accordance with the makers' recommendation.

Each 10-ton derrick crane commanded half of the dam, so that with the piling commencing at the two corners simultaneously the south face piles eventually met at the centre of the dam. Because of the tendency for the piles to lean over in the direction of driving, the gap between the piles, advancing from each corner, closed quicker at the top than at the bottom. To make the final closure, a special pile, narrow at the top and wide at the bottom, had therefore to be fabricated and driven.

The piling at the sides of the dam was also completed by driving from the two corners towards the quay walls and, to make a watertight seal, 12-in. x 12-in. shaped timbers were fitted between the skin piles and the quay walls. The making of these timber parts of the dam (called the gussets) in the case of the East Wall, proved to be a considerable problem. The wall was most irregular in shape, as it not only sloped outwards but also sloped inwards at the bottom—a most unusual and unexpected feature. It was impossible to seal completely with timber, and instead concrete was placed under-water by means of a tremie pipe.

Included in the skin piling there were ten special piles called paddle piles, which were fitted with sliding plates covering rectangular openings. In an emergency, these plates could be lifted if necessary by means of a screw arrangement, which would, of course, allow the water to enter and thereby flood the lock.

The sealing at the gussets marked the completion of the dam, but as the caisson was in commission at Sandon river entrances, the drying out of the lock could not commence, and, until it was finally released, divers were engaged in examining connections and keeping the sliding paddles in a high state of efficiency.

Drying Out of Lock

The first few hours of the de-watering operation was a dangerous period, for it was then that the possibility of a reverse load on the dam might have occurred. This could have happened just after the caisson was in position and the paddles of the dam closed. At this stage the water in the lock had no escape, and, if by some mischance the water level on the outside of the dam had fallen, perhaps by some ship locking out of the Canada Locks, then the water inside the dam would have been higher than outside, and a reverse load on the dam would have occurred.

To avoid this, the placing of the caisson and the closing of the paddles were carefully synchronised and, at the split moment of sealing, the cross culvert paddle was opened, releasing the pent-up lock water into the River Mersey.

Fig. 7.—View showing Relieving of Walls.

With the level of the water in the lock rapidly decreasing, the danger of any reverse load on the dam disappeared and instead a considerable pressure head developed, as desired, on the south face of the dam and on the north face of the caisson.

The structure of the dam was gradually revealed. The struts and all internal bracing appeared for the first time. To allow a thorough examination of the connections now visible, operations ceased when the water reached the underside of the third setting from the top, or roughly a quarter of the way down.

Daily reductions of the lock water by running off through the cross culvert continued, and with the installation of electric pumps the structure was eventually exposed as far as the ninth setting.

Blow in Dam

This was the position on a particular day. The next day only the top frame was showing above water. Some weakness in the dock bottom had developed overnight and with the clay losing its grip on the sheet piles, the dock water had burst under the skin piling into the lock.

Repairs to Gladstone-Hornby Lock—continued

The possibility of a " blow " had not been overlooked, as it will be remembered that the poorer quality of clay had been removed by dredging previous to the driving of the piles, which were rolled to their maximum practical length of 60-ft. Over and above this, a wall of clay bags built at the outside and bottom of the piles appeared to cover for this eventuality, but all these precautions were unavailing.

Actually, as was revealed later, the cause of the failure was the fact that the skin piles in the region of the " blow " had pierced the clay skin and continued into an invisible pocket of sand embedded between the layers of clay.

Fig. 8.—View of Lock with Caisson in background.

Repairs to Skin Piling

The " blow " had occurred on the south face over a length of about 70 feet. The foundation of the skin piles had been swept into the lock and a gap between the bottom of the piles and the lower layers of clay exposed. A large crater, similar to a bomb crater, had also been formed inside the dam, due to the bursting effect of the rush of water. Thus the piles, which to a certain extent carried the weight of the walings, had no support either under or behind them.

To re-seal the dam, short lengths of piles were spliced to the tops of the original piles and re-driven until the bottoms of the piles were embedded in the soft rock which lay below the clay bed, and, to give the necessary support at the back of the piles, the internal crater was filled with concrete poured down through the water, using a tremie tube.

It will be remembered that the walings were supported from some of the piles by bolts, which passed through the timbers and through the piles. These particular piles are called bolting piles, and as it was impossible to withdraw these bolts, these piles could not be driven.

Therefore, although the " blow " was generally sealed in this way, the gaps at the bolting piles still remained. On previous occasions when a dam has blown, these gaps have been sealed as best as possible with pounding clay in their region, but with this dam being of unusual size and weight, it was considered that some better method must be adopted. The difficulty was overcome by fabricating special piles, now called spade piles, and driving them outside the dam. These consisted of a 15 x 5 joist universal pile with a shaped thick plate riveted to one end, and, when made, had the appearance of a spade or shovel with a very long handle. The plate, which was about 6-ft. long, fitted over the bolting piles and the handle, which was the 15 x 5 joist, snugly fitted into the pan, so that when driven the plate cut down into clay to the rock bottom, efficiently covering the gap at the bottom of the bolting pile.

Again ready for the de-watering operation and with everybody having gained experience from the previous occasion, the action of sealing the lock and running off the water was carried out to its final conclusion without incident.

Survey of Damage and Outline of Proposed Reconstruction

The full extent of the damage could now be ascertained. The East Wall breach was seen to be about 80-ft. wide by about 27-ft. deep (as shown in Fig. 8). Unfortunately, as was only to be expected, the concrete in the vicinity of the breach had badly spalled and the spalling at the bottom of the breached wall continued another 15-ft. downwards, only leaving 9-ft. of the wall undamaged.

The reconstruction of the new wall will be on similar lines to the old, with the spalled sections cut back so that there will always be a reasonable thickness of new concrete thoroughly bonded to the old concrete.

The effect of the delayed action mine which had exploded in the region of the sill was greater than had been expected, so much so that it has been decided to reconstruct the sill completely.

Conclusion

The design and construction of the dam was executed by the Engineer's Department of the Mersey Docks and Harbour Board, and the reconstruction work is also being carried out by them, using direct labour.

The Author is indebted to Mr. Leighton, M.I.C.E., the Engineer-in-Chief of the Mersey Docks and Harbour Board, for his help in preparing and permission to publish this article.

Increased Traffic at the Port of Hamburg.

According to an official report just published, the Port of Hamburg handled 5,406 vessels, of 3,508,308 tons gross, during last year. These figures represent an increase of almost 50% over those for 1946. Vessels from more than 20 different countries resumed trade with the German port during the year, and the chief cargoes handled were raw materials for manufacture in Germany (56 per cent.) and supplies of food (36 per cent.). Communications between Hamburg and Britain, the United States, Canada, India and South America have been considerably increased.

Trade at the Port of Blyth.

At the annual meeting of the Blyth Harbour Commission, recently held in Newcastle, Mr. Rowland Lishman was re-elected chairman and Mr. Clifford Wilton deputy-chairman. It was reported that in 1947 the port had made a substantial recovery. Coal shipments totalled 4,775,636 tons, an increase of 616,106 tons over the previous year, and general trade had been satisfactory. This year had also begun well, coal shipments were up by 76,062 tons over January, 1947, and among these shipments were 2,873 tons to Sweden. It was hoped that this indicated a gradual expansion of export trade, which was such an important part of their pre-war trade. Shipments in January totalled 423,099 tons. On the engineering side, good progress had been made, both in maintenance work and dredging, and port facilities were in an excellent condition to deal with increased traffic.

The Law of Warehousing

An Outline of its Application to Port Authorities

By S. H. KESSELS.

One of the processes normal to trade—and especially to the business of a port or harbour undertaking—is the warehousing of goods for long or short periods at some stage of their transportation. The law on the subject has been established by common usage, modified or defined by case law and affected by statutes; and is inevitably complex, so that these notes may only attempt an outline.

Dock and harbour authorities and wharf owners undertake, of course, many functions besides warehousing, reference to which must be omitted except in so far as they may specially affect the warehousing rights and duties of such bodies. The owners of, say, a provision warehouse or a furniture depository may not be concerned with such special functions.

General Rights and Liabilities

The legal description of one who warehouses for profit is " bailee for reward." The entrusting of the goods to him is known as the " bailment " and the actual owners or depositors are the " bailors." (The term " bailor " includes not only the true owner of the goods, but his agent, such as a broker or carter).

The description of " bailee for reward " includes several classes of persons who are not warehousemen, e.g., bankers, innkeepers, carriers, pawnbrokers, whose rights and duties cannot be specifically dealt with here.

The full description of a bailment, as given in Halsbury's Laws of England, is " a delivery of personal chattels in trust, on a contract, express or implied, that the trust shall be duly executed, and the chattels redelivered in either their original or an altered form, as soon as the time or use for, or condition on which they were bailed shall have elapsed or been performed." The definition goes on to say that a bailment is distinguished from a sale.

To say it more simply (but less completely), the position is that the goods are held in trust for the time being by the warehouseman; and there is a contract of bailment, defined or implied. The intention is always that the goods be ultimately passed back to the bailor or passed on to someone he names.

The warehouseman (or " bailee "), when his proper charges are paid or secured, *must* account for or hand over the goods, as reasonably required, to the owner or his order; and he must also recognise the legal rights of any person to whom the title of the goods may be properly transferred. If he should fail to do so, the owner or his proper delegate may sue him.

A " common carrier " is generally liable for the consequences of all the acts or omissions of his servants (although he may limit that liability by agreement); but a warehouseman, unlike a common carrier, is only liable for his or his servants' negligence. A warehouseman (which terms generally includes his servants and agents) must exercise due diligence and care in the safe keeping of the goods entrusted to him, and also in any of the customary operations (like receiving, stowing, sorting, coopering, delivering) which he may be requested to perform upon them. If goods are damaged or lost while in his care, and a claim is made, the onus is upon him to show that he exercised this due diligence and care; and if he can do so, he is not liable. What is " due diligence and care " must, of course, depend on the circumstances of each case. The bailee must employ competent servants, and it would not be a defence for him to say that his employee did his best, if that best were below a reasonable standard. He must provide proper premises and use proper appliances so that the goods do not deteriorate from the lack of such provision or appliances. He would not be expected to leave exposed goods likely to suffer by exposure. If he should provide cold storage, he must take reasonable steps to see that the right temperature is maintained. He would not be liable if deterioration of stored substances were occasioned, say, by the failure of a power station not in his control.

The term " reasonable steps " would not include steps to avoid the consequence of exceptional flood, storm or natural disaster, which he could not be expected to forsee or provide against. Such events are known as " Acts of God," a term rather libellous to the Deity, as it is restricted to the bad things; it is a relic no doubt from times when all such dire events were regarded, like the plague, as Divine punishment.

Loss by Fire, Larceny, Etc.

The warehouseman (the bailee) is not an insurer, and does not assure the goods against all eventualities. He is therefore not liable for loss or damage by fire, unless it be clearly due to his negligence. (In practice, he will endeavour to satisfy requirements of Fire Offices Committees and take due precautions such as to forbid smoking in his warehouses). And because he is not an insurer, the bailee is also not liable for the wrongful acts of third parties, or unauthorised deeds of his servants acting outside the scope of their employment. Sometimes warehousemen undertake, for a special fee, the insurance of certain types of goods in their care; but, in the main, the bailors are well advised to make their own arrangements for insurance of their property.

[The Port of London Authority insure grain against ordinary fire risks, the fee being included in their wharfage and quay rates, but they do not insure other commodities].

So, too, the warehouseman is not liable for criminal acts (such as larceny and fraudulent removal) by his own servants or by third parties, so long as he takes all reasonable steps to safeguard the property entrusted to him; the onus being on him to show that he took such steps.*

This may imply that he shall employ watchmen, gate-keepers, or possibly police and that he provide adequately secured and protected premises. He may fail in establishing the defence of having taken due care if he has employed a servant of known bad character or one whose character he made no effort to ascertain. In the days of casual labour it was not feasible for the dock or wharf owner to enquire into the history of every casual labourer, but he would not have been expected to give such person of unknown character a position of special trust, as that of a watchman. Nor can the port employer now make enquiries, because, where a Dock Labour Scheme applies, he is bound (subject to certain rights in the case of a labourer's misconduct) to accept those men that are offered to him by the National Dock Labour Board, Ltd.

An interesting case on reasonable enquiries as to the character of a servant is that of Homecraft Weavers, Ltd., v. Geo. Ewer & Co., Ltd., and Another, Lloyd's List Law Reports, Vol. 78 (1945), which concerned a cartage contractor.

Claims and Measure of Damages

When merchandise cannot be delivered by a bailee as legally required, the loss or failure to deliver is regarded as " conversion," and the measure of damages which the owner can claim is the market value at the time of the conversion, that is the time of the loss of, or failure to produce, the merchandise. Generally speaking, the owner cannot recover more than such value plus incidental expenses, so that he cannot claim for " consequential damage " which may be too remote. He could not argue, for instance, that he was waiting on a rising market, and that he could sell his goods for more at the time of payment of his claim than he could at the moment of the conversion, which may have been some while before.

The owner of the goods could, however, claim expenses that naturally and closely follow in the case of loss or of damage to goods caused by the warehouseman's negligence. Thus he could rightfully include in his claim survey fees on, or the cost of salvaging or repairing, damaged goods.

In some ways the warehouseman has the same rights in goods against a third party as the rightful owner had: thus, if the warehouseman has delivered goods in error to B and recompensed A (the true owner) he may sue B for their return or their value at the time of the wrong delivery. He may prosecute those who have stolen goods from his custody as if the goods were his own. In fact in the criminal proceedings in such cases the stolen goods are usually described as the property of the bailee.

*See the case of Brook's Wharf and Bull Wharf Ltd. v. Goodman Bros. (54 Ll. L. Rep. page 147). Here it was held that the Wharfingers were not only not liable for loss by larceny as they had taken reasonable care, but they could also recover Duty they had been made to pay.

The Law of Warehousing—continued

Liability Clauses

As the process of warehousing is deemed to be under contract (whether definite or merely implied) its terms and conditions can be varied or defined; but the bailor must know of, or assent to, the conditions. This does not mean that they must actually be thrust into his hands, or that he must say " Yes, I agree " in each case. It is usually sufficient (provided the condition is not an exceptional one or counter to a statute) if the terms and conditions are published or made accessible to the merchants (the bailors). The practice is to display copies at suitable accessible places like the warehouses or the chief office of the warehouseman, and attention may be drawn to them on letter paper, accounts and receipts.

The Port of London Authority, for instance, accept goods for warehousing on the terms set out in their published tariffs. These must be read, of course, to learn their full meaning, but the main terms may be summarised as follows:—

Liability is not accepted for loss or damage arising otherwise than from the negligence of the Port Authority, nor is it accepted:

(a) Unless loss or damage be notified within seven days of removal of the goods.
(b) In any case in respect of certain specified goods, including hazardous goods, unprotected machinery, marble slabs, etc., which are dealt with at the owner's risk only.
(c) For loss or damaged occasioned by:
  1. Vermin.
  2. Frail, unsuitable or defective packing or packages.
  3. Inherent vice or quality of the goods or packages.
  4. Labour strikes, combinations or lock-outs.
  5. Improper or inadequate marking of goods.
  6. Fire (except by special arrangement).
  7. Civil commotion or acts of the King's enemies.
(d) Where opportunity to examine alleged damage is not given within reasonable time.
(e) When a single package exceeds £100 in value unless the contents and value be declared and the appropriate rates paid prior to delivery. (This declaration gives the Port Authority opportunity to take such extra care as they think appropriate).
(f) In respect of goods temporarily landed by shipowners for re-delivery; and after goods are delivered to the bailor's craft or other conveyance.
(g) For loss, or damage, through the Authority's failure to comply with the Rules in the Schedule to the Carriage of Goods by Sea Act, 1924. (This Act was to standardise the rights of holders of bills of lading against shipowners, and to impose on shipowners more precise rights and liabilities in place of their previous liberty to impose what terms they liked. The Rules may at times affect a wharfinger or dock owner as agent of a carrier of goods by sea).
(h) For loss or damage during the conveyance of goods as described in the Carriers' Act, 1830, unless they be declared and an insurance be paid for the risk incurred.

When conveying goods by lighter, the Port Authority do so under the terms of the London Lighterage Clause, which states that the goods are carried entirely at the owner's risk, except for larceny up to £20 a package and not over £50 a ton.

It will be seen that most of these terms are definitions, or reiterations of the general law on the subject and the other clauses make explicit the law in detail or define and clarify usual practices, so that what are " due diligence and care " by the warehouseman may be the more easily interpreted.

The Mersey Docks and Harbour Board publish conditions in their rate books to the effect that they will not be responsible for delay, loss or damage due to labour disputes or labour shortage, defects in casks or packages, the effect of vermin or natural causes. They also state specifically that they do not insure goods in their warehouses or on their quays or other premises, and they are not liable for the results of fire, nor are they liable for any delay in carrying out orders by merchants, although such orders will be executed as soon as possible.

Sec. 350 of the Mersey Dock Acts Consolidation Act of 1858 provides that no liability shall attach to the Board for loss or damage due to fire, storm, tempest, civil commotion, acts of the Queen's enemies or inevitable accident. It thereby affirms the general law of bailment.

The Mersey Docks Acts and Byelaws contain special provisions (particular to the Ports of Liverpool and Birkenhead) as to the rapid removal of goods from the quays and transit sheds, the power to warehouse goods left therein for more than short periods. The Board publish a notice as follows:—

NOTICE.—As to Goods on the Quays—All goods laid down or passing over the quays of the docks of this Board are at the owner's sole risk in every respect. The Board have no custody of such goods and will not be responsible for loss of damage by fire, theft, weather, or otherwise howsoever. Those in charge of goods should protect them from loss, damage, or injury, and special care is necessary in the case of goods susceptible to taint or stain.

The Board also have provisions regulating the appointment, work and charges of the Master Porters who do most of the unloading, loading, delivery and other operations in the port. For such work they are paid by the owners of the goods, at rates fixed by the Board.

These provisions are set out in Sections 32 and 35 to 43, of the Mersey Dock Acts Consolidation Act, 1858; Section 33 of the Mersey Docks (Ferry Accommodation) Act, 1860; Sections 12 to 19, 23, 24, 34 and 35 of the Mersey Docks (Corporation Purchase) Act, 1861; Section 3 of the Mersey Docks (Various Powers) Act, 1898, and Section 16 of the Mersey Docks and Harbour Board Act, 1919. There are also Byelaws relating to Master Porters, made under these Acts.

While goods are in their care, such Master Porters are in the position of bailees. Byelaw 11 of the above-mentioned Byelaws requires (subject to certain provisoes) that the Master Porters shall continue to watch goods unloaded by them until the goods shall be actually loaded off from the quay, and Byelaws 4 and 12 lay down the charges that may be made for such watching.

Notices as to Liability (Generally).

The question of the validity of special notices denying liability in certain events is a difficult but interesting one. We are all used to seeing such notices on the backs of excursion tickets, in cloak rooms and public places, and warehousemen no doubt have considered how far they could avoid liability by such means. A bailee cannot so easily escape a liability imposed on him by statute or the law at large; but he may be able to limit his liability by notice, provided:—

(a) the liability is not one which by Statute is made incapable of limitation;
(b) the notice is clear and definite and within the knowledge of the persons affected;
(c) the limitation is not contrary to " public policy." Where an Authority is bound by statute to provide dock or warehouse facilities (subject to payment of proper charges) to all proper persons, it is open to the latter to refuse to allow the Authority to limit its existing liability, but both parties may waive this right by special agreement. An Authority cannot restrict its liability when it is exercising a power or right specially conferred by its enabling Statute.

The Courts seem to acknowledge more readily the effect of notices where voluntary acts by the bailee are concerned, that is, those he is not obliged to perform by Statute.

Customs Requirements

Waterside warehousemen are very much concerned with Customs Regulations, as the greater part of imported goods are dutiable nowadays. Before they can handle such goods, they must be authorised by the Commissioners of Customs and Excise, or by their regulations. Most of their warehouses are in effect " bonded " warehouses. They must produce the goods, or make them accessible, to Customs Officers as required; they must not allow them to be taken out of the warehouses (" out of bond ")

The Law of Warehousing—continued

without due " entry " or they will be liable to pay the duties. " Entry " means the passing by the owner or his agent of a customs entry form and the payment or securing of the appropriate duty.

Sections 172 and 173 of the Port of London (Consolidation) Act, 1920, give the Port Authority power to pass Customs entries (and charge for so doing) if the despatch of business is hindered by the failure of the owner or consignee to pass the said entries. The Mersey Docks and Harbour Board have similar (but somewhat wider) powers under Sections 90 to 93, 167, 191 (as to goods on board a vessel) and 192 of their Consolidation Act of 1858; and Section 29 of their Act of 1920.

Rents and Charges

A warehouseman's revenue derives from charges for services rendered and from rent on the goods stored by him, the latter being often the major source of income. Rents and charges are usually defined by published tariffs; and in the absence of fixed tariffs or of previous agreement, they could not be enforced unless they were shown to be reasonable.

The bailor is entitled to be made aware of the fixed rates in the same manner as he may be deemed to be made aware of the liability clauses already referred to.

In the case of statutory bodies their rates are usually subject to control by Local or Parliamentary authorities imposed by their particular statutes.

The maximum landing, wharfage and porterage rates that the Port of London Authority may take are enacted by the Port of London (Dock Charges) Act, 1923. Other rates (including rent for housing and rates for other services) are such reasonable rates as the Port Authority may appoint and are not subject to any maxima (see Section 3 of the Act).

Procedure for the revision of rates is also provided by the same Act. Section 93 of the Port of London (Consolidation) Act, 1920, provides that lists of rates be exhibited.

Section 186 of the Mersey Dock Acts Consolidation Act, 1858, provides that rates and rents shall be fixed by persons named, that they be reasonable and exhibited. The persons named have been slightly amended by Section 5 of the Mersey Docks and Harbour Board Act, 1923.

To avoid preferential treatment, all rates taken by public harbour authorities are charged equally in respect of all goods of the same description in the same circumstances in the same dock.

Warehousemen and wharfingers frequently fix their charges and rents by agreement among themselves or with other concerns engaged in similar business, and often after requests for the fixing of a rate by merchants interested in certain commodities.

Liens

What is the remedy of the bailee if his charges of any kind are not paid? It is the lien that he has on the goods themselves, that is, he can hold them as security against payment. To have the right to restrain not only the goods on which charges are due, but other goods in his custody standing in the name of the same defaulting owner, requires special statutory power, although the terms of the contract or even established trade custom may confer such a right (which is known as a " general lien "). The bailee cannot charge rent during detention of goods in exercise of the lien.

By certain actions, the bailee may lose his lien; for example, he cannot exercise it if he has sued the debtor for charges and obtained judgment in Court, for by so doing he is deemed to have surrendered his lien in favour of the judgment. And if A, an owner of goods, who owes the bailee for charges, transfers the goods to the name of B, and the warehouseman accepts the transfer, the latter loses the lien on the goods as against A.

A landlord cannot restrain (that is, claim) bailor's goods in a warehouse for unpaid rent of the premises, where the warehouseman is his tenant.

Stops for Freight

While on the subject of liens, it must be mentioned that in some circumstances a shipowner may extend his right of lien to goods in the warehouseman's possession. If, for example, freight is owed by the importer, and the goods have been landed and passed to the care of the warehouseman as bailee, the shipowner may instruct the bailee in writing to stop delivery until the freight be paid or secured; and the bailee must observe that " stop."

In the case of the Port of Liverpool the legal provisions as to freight stops (and other liens existing prior to landing of goods) are stated in Sections 193 to 199 of the Mersey Dock Acts Consolidation Act, 1858. They include a power of sale in certain eventualities.

As to the Port of London, the stop for freight is dealt with in Section 167 of the Port of London (Consolidation) Act, 1920.

Notices to detain goods for freight are not valid if a warrant for delivery (or dock warrant) has already been issued. (See later, as to warrants).

Sale of Goods Against Charges

A warehouseman has not, generally speaking, a right of sale of bailor's goods to realise his own charges, unless the right is conferred specifically by statute.

The Port of London Authority has such a right by virtue of Sections 78 to 82, and 84 of their Consolidation Act of 1920 (Section 82 confers, in effect, a right of general lien). Section 189 of the Mersey Dock Acts Consolidation Act, 1858, gives virtually the same power of sale to the Mersey Docks and Harbour Board as the above-mentioned Section 78. Section 89 of the same Act (of 1858) and Section 35 of the Mersey Docks (Corporation Purchase) Act, 1861, give the Board power to sell goods not removed from quays by the owners and on which charges are unpaid after ten days of the time of removal by the Board of such goods from quays.

Notice of intention to sell must be given, and out of the proceeds any Customs duty must first be paid. The balance can be retained by the Dock Authority against their sale expenses, rent and charges and for the payment of any outstanding freight. After these have been satisfied, any surplus must be passed to the bailor concerned, and for any deficiency the latter may be sued. In practice, it rarely proves to be worth the legal costs to sue a bailor who has abandoned his goods.

Warrants, Etc.

Wharfingers and warehouse-keepers often issue certificates (known as warehouse-keepers' certificates) saying that certain specified goods are held in their care in the name of so and so. They are documents of title to the goods, transferable by endorsement, unless (as is sometimes the case) the certificate merely acknowledges that such goods are in the warehouseman's possession, when they are *not* regarded as documents of title.

The Mersey Docks and Harbour Board and the Port of London Authority are enabled by Sections 200, and 166 to 170, respectively of their Consolidation Acts, to issue certificates and warrants (commonly known as " Dock warrants ") in favour of the person entitled to them. They are definitely documents of title, and the title passes with endorsement to another party, as in the case of warehouse-keepers' certificates. Before the warrants or certificates can be issued, freight, duty, liens and all charges and rent on the goods must first be satisfied; although sometimes " prime warrants " are issued by dock owners to merchants before payment of landing or other charges, merely on production of a bill of lading. These are also documents of title and may be exchanged for warrants on payment of all charges to date.

All these documents of title are, of course, very useful to merchants in buying and selling goods, and they are frequently used in raising short loans from bankers. Possession of a warrant does not, however, override the bailee's lien for charges incurred after the date of issue of the warrant.

Transfers of Title

Subject, again, to his own right to secure his charges, the warehouseman will recognise any transfers of title to goods presented in proper form—such as endorsed bills of lading, warrants, transfer or delivery orders, recognised by law or trade custom. The bill of lading is, of course, the usual document of title to goods landed ex-ship. In the course of business, transfers of title are often

The Law of Warehousing—continued

numerous, and to record them properly is an intricate process requiring care and experience on the part of the bailee's ledger-keeper. Arguments may arise about title, or wrongful transfer —for example, an unpaid seller may seek to restrain the bailee from delivering goods, or several parties may claim possession. In such doubtful cases, the bailee is well advised to consult at once his solicitors, who may commence Interpleader proceedings in a Court of Law, and the bailee may then safely obey the direction of the Court.

A Dock Company is not guilty of " conversion " if goods are delivered upon production of a bill of lading, if there was no notice of another claim (see Glyn, Mills, Currie & Co. v East and West India Dock Co., 1881-2, Appeal Cases).

When an unpaid seller puts a " stop " on goods in a warehouseman's possession, it may not be easy for the latter alone to decide if the legal ownership has already " passed " to the buyer, and the seller has lost his own power of " estoppel " (that is, right to restrain the bailee from delivery). As a broad rule, if no question of fraud is involved, legal ownership passes when the document of transfer has been fully accepted by the warehouseman. If the transfer has been recorded and acknowledged by the warehouseman, the acceptance is definite.

When part of a bulk commodity (like loose grain) is transferred the ownership does not pass until the part has been physically ascertained and separated from the rest by the bailee.*

Receipts and Tallies

What is the legal evidence as to the state and quantity of goods deposited or delivered with the bailee? Usually it is a signed receipt (claused, if necessary, as to the state of the goods) and generally, by custom, based on tallies made by one or both parties at the time of landing, housing or delivery. But it must be emphasised that a receipt is not an absolute proof, that it is only prima facie evidence, so that it can be rebutted by other evidence that may prove the receipt to have been given carelessly, in error or by fraud.

Certain customs or published conditions may establish the true measure of goods for which the bailee may be liable. For example, the Port of London Authority, who store quantities of timber, only recognise the quantity and type of timber shown in their own landing account, which is compiled after the timber has been sorted, piled and counted by their employees. The Mersey Docks and Harbour Board have a condition that the weight of grain registered by the Hopper may be fairly accepted as the true weight as between all parties interested.

Here is must be reiterated that this article has not scope for more than a cursory survey, and that all Acts, conditions and cases referred to should be read in their entirety to find their full significance.

Far from simple is the law concerning documents of title alone, and for fuller knowledge, such books as Purchase on " Documents of Title " and Scrutton on " Charterparties and Bills of Lading " should be consulted. The legal status of a warehouseman may be complicated by his being (as often is the case) dock-owner, stevedore and carrier in the bargain, and at certain times he may be in effect agent for both shipowner and consignee (or his transferee). Be it remembered, too, that different ports and trades have local customs which may have the validity and force of law.

(*See Laurie & Morewood v. J. Dudin & Sons, 1926, Kings Bench).

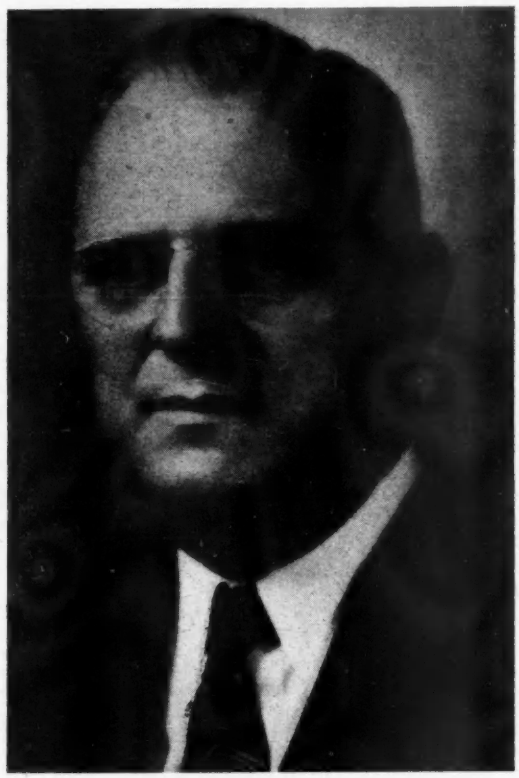
Dredging Operations in the Far East.

The Chinese Government has approved plans for the reconstruction of Whampoa Harbour to take ships of up to 5,000 n.r. tons, and one of the largest dredgers in the Far East, a former Japanese craft with a capacity of 1,000 tons an hour, which was taken over from the Japanese at Hainan Island after the war, has been completely refitted by the Hong Kong & Whampoa Dock Company for use in dredging the Pearl River and Whampoa Harbour, which, owing to neglect, have become badly silted.

Notable Port Personalities

LV—Mr. EDWARD O. JEWELL

Mr. Edward Oswald Jewell was appointed general manager of the Board of Commissioners of the Port of New Orleans a few months after Pearl Harbour, and the beginning of his administration marked a complete re-organisation of the Dock Board and prepared the way for the war-time duty which was to earn for New Orleans the commendation of the army for efficient port working.



MR. EDWARD O. JEWELL.

Prior to his appointment as general manager, Mr. Jewell had served two years with the Port Commission as director of commerce, having been one of the group selected by Governor Sam Jones in 1940 to administer port affairs.

A native of New Orleans, Mr. Jewell entered the export cotton business as a young man, eventually forming his own company in 1926. As president of E. O. Jewell & Company, he travelled extensively abroad, visiting and studying every major port in the world, with a view to improving the efficiency of export cotton handling at New Orleans.

Since he assumed the general managership of the Port Commission in 1942, Mr. Jewell has been very active in the promotion of world trade in the mid-continent and Gulf regions. In 1945, he founded the Gulf Ports Association and became its first president. At present he is chairman of the Association's World Trade Development Committee and a member of the Board of Directors.

In 1946, in recognition of his accomplishments in port operation, he was elected president of the American Association of Port Authorities. He has now been succeeded in this office by Mr. R. K. Smith, Chairman of the National Harbours Board of Canada.

Mr. Jewell is a member of the Board of Directors of the Rotarians, a former Board member of the Cotton Exchange, Past President of the Spot Cotton Merchants' Association, and one of the founders of the National Cotton Council.

Recent Developments in Cargo Handling Efficiency

By RALPH I. SCHNEIDER
(Acting Chief, Port Development Branch, Research Division of the United States Maritime Commission).*

National Advisory Committee on Materials Handling

The Port Development Branch of the Research Division, United States Maritime Commission, is endeavouring to develop information regarding modern cargo handling methods and procedures and intends to circulate its findings to the maritime industry as helpful data designed to increase productivity and lower cargo handling costs. To this end, we have asked a number of cargo handling experts from representative ports on each coast to act as an advisory group to the Maritime Commission, in an effort to pool the combined knowledge and experience of the entire stevedoring industry for the benefit of several members and for the good of the maritime industry as a whole. This group is known as the National Advisory Committee on Materials Handling.

Factual information regarding cargo handling experience thus obtained is presented to you here, not as a standard of operation, but merely in the hope that it may be of some value to you in your own operations.

Summary

So much has been said and written about the disproportionate part which cargo handling costs at United States ports play in the total cost of operating ocean-going vessels, that it may surprise some of you to learn that since the cessation of hostilities some terminal operators have been able to step up their operations to the point where, in spite of wage increases, they actually have been able to lower the per ton cost of handling cargo between ship and pier. For example, at one United States terminal which has been under study by members of the staff of the Port Development Branch, Research Division, and of the staff of the Merchant Marine Academy, a reduction of 22% in the cost of handling revenue tons of export general cargo has been accomplished in the face of a 30% increase in wages and of added overtime to meet sailing schedules. Moreover, from other ports, authoritative reports indicate that the productivity of longshoring labour has been on the increase, with the concomitant result of lowering the per ton cost of handling such cargoes. During the war both the army and navy, through management control methods and through palletizing cargo and introduction of cargo-unit loading methods, cut loading costs to a surprisingly low figure.

Lack of Adequate Statistics

In the past, one of the principal deterrents in making a study of this kind has been the lack of adequate statistical data on terminal operations. The first published study of any magnitude of this description was undertaken by the Department of Labour in 1932, at which time spot checks were made relative to longshoring efficiency on a man-hour and gang-hour basis, at selected terminals and of selected steamship lines in foreign, coastwise and inter-coastal trades. No comprehensive nationwide surveys of this nature has been made since, although the Pacific Coast Waterfront Employers' Association has for many years kept comprehensive data on longshore activities on that coast.

Possibly as a result of experiences during the war, it is believed that some of the principal stevedoring operators now are maintaining improved statistical records, which will be of great value in measuring the progress made in handling cargo between ship and shore over the next few years.

DEVELOPMENTS AT PRIVATE TERMINALS.

Terminal " A "—Efficiency Improvement

At one terminal which was selected for study, most complete statistical records have been maintained for a number of years. These records revealed an exceptional improvement of 78% in the man-hour stevedore productivity on a revenue ton basis for export cargo, whereas a 48% improvement occurred on a revenue ton basis on import cargo during the past two and a half years. Stevedoring gang hour performance on export cargo improved 85% and on import cargo 40% during the same period. Both man-hour and gang-hour performance for export cargo on weight ton basis showed less improvement than on a revenue ton basis. This variance is explained largely by the fact that the ratio of revenue ton to weight on export cargo gradually increased from 1.37 in 1945 to 1.78 in 1946, or from 55 cubic feet to 71 cubic feet per long ton, a ratio which still persists. However, despite this " ballooning " of export cargo, an improvement of 52% per man hour and 60% per gang hour was reflected in the export weight ton performance.

Unlike export cargo, the ratio of weight to measurement ton on import cargo remained almost constant at 1.1 revenue ton to one weight ton. On import cargo, on a weight ton basis, the performance per man-hour improved 54%, while the gang-hour output increased 58% in the same period.

As has been stated before, stevedoring costs at this terminal during the period of record were reduced substantially on the main component of cargo in the face of increased wage rates. Reduction in costs of 22% on export cargo on revenue ton basis, in spite of 30% wage increase, is certainly significant. It is likewise significant that handling unit costs declined despite an unusual high ratio of overtime work required to meet rigid sailing schedules.

Terminal Design Outmoded

All of these improvements were made despite the fact that this terminal is by no means of modern design, nor is the physical lay-out both on the water and land sides conducive to efficient cargo handling methods.

The above noted improvements in cargo handling results were brought about by several factors, principal among which were management-control, work methods, modern cargo handling gear on the terminal, adaptation of ship cargo handling gear to meet terminal requirements, skilfully planned cargo layout and labour incentives.

Statistical Control Maintained

A tight work methods procedure and performance control is maintained by the terminal on a continuous work-operation basis. The terminal manager is kept informed currently of the correct estimate of the cargo handling situation by means of brief check-reports covering loading or discharging rates by hatches, together with the number of stevedore gangs and the extra labour employed. Operational reports from spot check-clerks enable the control clerk to keep a current running record of each day's operations as it progresses. Through this current position report, the manager is able to ascertain the degree to which he is meeting his planned schedules and whether to add or withdraw labour as the situation requires.

Mechanised Equipment

To overcome handicaps imposed by outmoded pier design, as far as possible, numerous units of various types of portable handling equipment, including fork lifts, tractor cranes, tractor or trailers and platform lifts, are employed to the greatest possible extent; their use being limited only by the inherent defects in the pier design as regards modern port operation.

In order to maintain this equipment in good running order, motor maintenance and repair shops have been set up in the headhouse and careful records are kept on all mobile equipment, to ensure its being properly serviced and maintained. Likewise a space for maintenance of stevedore gear has been provided in the same location.

Improvement in Ship's Gear

Terminal structural inadequacy has in some measure been compensated for by improvement in ship's cargo handling gear. Inasmuch as this terminal handles only vessels of the line operating it, ship's gear has been so adapted as to enhance terminal efficiency. Cargo booms have been lengthened to as much

*Paper read before the Stevedoring and Cargo Handling Section of the American Merchant Marine Conference in New York on 17th October, 1947.

Recent Developments in Cargo Handling Efficiency—continued

as 65 feet and have been strengthened to lift 10 tons. Winches have been equipped with double drums and cargo booms have been fitted with topping winches for rapid trimming of booms. Also extra winches and drums permit house falls Burton lines to be worked from ship's deck. The vessels have been equipped with sufficient gear to double-gang hatches, and it is not unusual for such ships to discharge certain types of general cargo simultaneously from five hatches at the rate of 40 tons per hatch per hour.

Cargo Lay-out

The terminal operator lays out his cargo skilfully opposite the hatch into which it is to be loaded whenever conditions permit. Truck discharging and outloading is done only when such work will not interfere with stevedoring operations. Freight arrivals are planned insofar as practicable to avoid delays, and detentions are at a minimum. The upper deck of the transit shed is laid out to receive inbound light bale and bag cargo, which is chuted to trucks in the lower level truck aisles. Since the upper deck is also used for passenger traffic, the slip-side spaces are kept clear; the centre line space being used to contain discharged cargo.

The lower deck is laid out with two single lane truck aisles adjacent to and stepped in about 20 feet from the doors. Cargo is passed in from or out to motor trucks engaged in handling cargo. Motor trucks are not permitted to stand on the pier while awaiting discharge or loading.

Work Incentives

Management has done everything within its power to making working environment as healthful, safe and cheerful as has been possible under the circumstances. Stable employment, high wage rates and the opportunity for overtime work are conducive to conditions satisfactory to labour. Since steady employment is assured for efficient performance of duties, the labour turnover is comparatively small. Work conditions have been improved by providing heated rest rooms and toilets; work areas are well lighted and painted, and safety inspectors and first aid stations have been provided. A spirit of healthy inter-gang rivalry has been induced by posting gang records on a bulletin board displayed in a conspicuous place.

Terminal " B "—Efficiency Improvement

Information regarding operations at another terminal under study is not so detailed nor inclusive as that of the terminal just discussed. However, the record does reveal that between the two three-month periods sampled at this terminal, namely, January through March, 1946, and January through March, 1947, an increase of 15% improvement in gang hour productivity was experienced. Longshore efficiency there, while not yet up to the pre-war level, is approaching it. This improvement, however, did not offset the increases of 26% in handling costs from $1.15 per ton in the 1946 period to $1.45 per ton in 1947. It should be noted, however, that the increases in handling cost are not out of line with the rise in costs of goods and services in other industries.

Reasons for Improvements

The principal reason to which improvement at this terminal is attributed is the return of trained longshore labour from war-time pursuits outside of the local stevedoring industry and the return from war service of supervisory personnel. Secondary contributions to improvement in longshore productivity have been: (1) improved ship's gear (most of the ships handled at this terminal are of modern design); and (2) less congestion of transit sheds and terminal transportation services.

Unlike the outmoded design of the other terminal under study, this terminal is of comparatively modern design; in fact, it is considered to be as efficient as any publicly-owned terminal in the United States. It possesses adequate transit shed space and sufficient rail, motor truck and barge transport support. Its principal weakness lies in the lack of adequate storage for holding goods in support of shipping.

To this point, the efforts and results of private industry to improve longshoring productivity since the war have been discussed. Now I wish to review briefly the results attending the efforts of the military services under the pressure of war-time conditions.

Army-Navy Experience

During World War II, the armed forces controlled the operation of some of the best port terminal facilities at principal United States ports. Under their management they were able to bring about a 20% improvement in cargo handling efficiency and a 30% reduction in unit costs. A study of these operations has been made with a view to examining such methods and procedures which enabled the services to accomplish their mission which might be retained and developed to advantage by post-war commercial operators.

Unified Control

Under the military services, unified control of the movement of cargo to and from shipside by inland transport was inaugurated. This control had great influence on the improvement above mentioned, since it lessened possibilities of extreme port congestion. Terminal operations were organised under a works management and production control method. Only those terminals capable of continuous high satisfactory performance were used. Work measurement units were developed and output standards were set to raise sustained output to an approximate level of the normal maximum. The raising of the average of the industry to the normal maximum required some mechanisation. Moreover, a system of statistical control was instituted to elevate the efficiency of each terminal and enabled the port management in each case to plan targets, evaluate current positions and forecast future capabilities.

Mechanisation

Fork lift trucks and pallets, which became the standard method for cargo handling, improved dispatch and productivity and reduced handling costs. Sufficient trials of these methods were made to show that ship-loading time could be cut in half, man-hour requirements could be reduced one third, and labour costs could be cut by 25% by port terminal mechanisation, together with flexible distribution of men. Crawler cranes, roller and power conveyors were introduced into many terminals for the first time. With the introduction of mechanical equipment, standard procedures and engineered work processes were developed. Depots were planned, as far as possible, to coincide with pre-stowage plans of vessels.

Port Capacity Limited by Land Transport

As the military services proved conclusively that a port's capacity was limited in most cases by the capacity of land transportation systems to receive and deliver cargo, construction of increased in-transit storage in support of the ports was initiated. Adjacent " Bank " yards were constructed at the back of ports so that irregular large demands could be met in excess of peak rail delivery potentials. Where belt lines existed, movements over them were improved, and where none existed interchange and connecting trackage was constructed.

Statistical Control

In maintaining central statistical control, the services were enabled to bring about and maintain low vessel loading time on all types of cargo; high man-hour productivity of longshore labour; freedom from rail embargoes; good vessel utilisation and low costs. The navy, profiting from experiences of the army on the East Coast, were able to cut navy auxiliary vessel loading time to an average of 2½ days by means of palletizing cargo and introducing unit loading methods. Handling costs during the war were lowest at New Orleans and Seattle, while the productivity rate was highest at New Orleans.

Foreign Port Efficiency

In spite of this stepping-up of productivity in American ports, ship-loading time in those ports exceeded unloading time in major foreign ports immediately following the war. Outstanding among these foreign ports was Calcutta, which outperformed the best United States ports by a substantial margin.

Recent Developments in Cargo Handling Efficiency—continued

Physical Obstacles to Greater Efficiency

Principal obstacles to greater efficiency in the United States ports were lack of longshore labour, lack of good rail in-transit storage yards, lack of heavy lift equipment, obsolescence of terminals and outmoded cargo handling methods. As was pointed out by the National Advisory Committee on Materials Handling, one of the causes of slow-down in the handling of cargo between ship and shore is lack of standard and adequate packaging of cargo for waterborne traffic. The military services during the war set up Joint Committees on cargo handling and packaging, which resulted in creating standard size packages, standard identification markings, and standard types of cargo handling equipment. This standardisation policy was intensified as the war progressed.

Loading Experiments

Experiments were conducted in loading vessels to improve their utilisation, decrease loading time, reduce man-hour requirements and cut costs. The navy, in its experiments, proved that vessels adapted to stowing cargo with cargo-handling equipment could be loaded in less than one-third of the time required for loading conventional ships employing conventional methods, cutting man-hours by 70% and labour costs by 75% by using suitable ships' and materials' handling equipment. It further demonstrated that it was practical to load vessels with no more than 3.8% increase in broken stowage if internal alterations were made to adapt ships for palletized loading. Of course, in assaying these accomplishments, it must be borne in mind that packaging of military cargo was designed particularly with an eye to facilitating its handling, a feature which is given little consideration by the average exporter in normal, peacetime, commercial operations.

Conclusion

In conclusion, I wish to make the observation that the studies of the terminals and of the army and navy experience during the war, discussed here, indicate progress in solving a most difficult problem. At the same time, I wish to thank the members of the National Advisory Committee on Materials Handling, and all others, whose studies have made this paper possible. That the importance of a definite solution to the problem of excessive terminal costs is receiving the attention of the industry as a whole is further evidenced by the appointment, during the past month, of a Survey Committee on Cargo Handling and Terminal Operations by the President of the National Federation of American Shipping.

Theft and Pilferage at Ports

Suggested New Approach to the Problem

At a meeting of the Liverpool Branch of the Institute of Export held on the 28th January last, an address was delivered by Mr. Harold H. Mummery, underwriter and manager of the marine department of the London Assurance, in which he put forward suggestions to combat the evils of theft and pilferage of goods in transit. Mr. Mummery stated that, in his opinion, the correct approach to the problem was for representatives from the separate committees now in existence to amalgamate into one main committee so as to pool their knowledge and experience.

At the beginning of his address, Mr. Mummery said the matter had for many months now been causing him a great deal of concern, chiefly because of the fact that the vast sums which underwriters in this country are being called upon to pay for claims due to theft and pilferage, and claims which could be attributed to indifferent or bad packing must be both a hindrance to and a drag on Britain's export drive. It meant that every article emanating from this country for sale overseas, which was stolen and which found its way to the black markets throughout the world reduced the value of our exports. Because of this, underwriters in this country have a real responsibility. One realises that shippers are handicapped in many respects, in that it is impossible for them to obtain packing which compares with the form of packing they used prior to the war. The fact remains that, beyond this, there is a considerable amount of indifferent packing which, by itself, gives facilities for theft.

If underwriters increase their rates to meet the costs of these theft and pilferage claims, then this additional premium must needs be debited by the shipper in his costs to the consignee, and this may influence the supplier receiving the order, when he is trading in a competitive market.

They knew there were sitting at the present time, a number of individual committees studying the question of packing, studying this all-important matter of theft and pilferage, and how the latter can be avoided. It is a matter than concerns shippers, dock authorities, shipowners and underwriters. It would therefore be a wise plan for representatives from these individual committees to get together and form one committee, representative of all the interested parties.

If this were done they would learn something of the other man's problem, and maybe they could make suggestions which would be helpful and constructive. Fundamentally, he felt that the secret of combating this evil of theft and pilferage was that an adequate system of supervision should be set up at all stages of the journey.

It was no exaggeration to say that thieves are active during packing, and en route from the shippers' warehouse to the port; they are active in the area of the port, and in certain instances, goods are stolen while on board the carrying steamer. They are certainly stolen at ports of transhipment, and at the port of destination.

Continuing, Mr. Mummery said he had noticed that from time to time efforts had been made by the spokesmen of interests concerned with the problem, to apportion responsibility amongst the various transport undertakings engaged in one stage of transit or another—always to the advantage of their own. That practice of seeking to evade the issue was much to be deprecated; it was a negative reaction, whereas the important thing was for all concerned to set their own house in order and make the major contribution to the cause.

The system he visualised would be expensive, although, in his opinion, the cost would justify itself very quickly. It would provide that at each stage of the journey a proper tally was kept, and a proper inspection made. This was customary in this country in normal times, and had been tried, very successfully, in other parts of the world.

It would probably be remembered that, after the First World War, underwriters were called upon to pay large sums to liquidate the claims for theft and pilferage, with the result that, eventually, the market, in order to protect itself, was forced to introduce what became known as the Institute Theft, Pilferage and Non-Delivery (75 per cent.) Clause, and subsequently the Institute Theft, Pilferage and Non-Delivery (Shipping Value) Clause. The introduction of those clauses certainly resulted in claims for theft and pilferage being reduced. He would like, therefore, to couple with his proposal in regard to the matter of supervision, a suggestion that the market should once again introduce the Institute Theft, Pilferage and Non-Delivery (Shipping Value) Clause. By so doing, they would throw upon the consignee a greater sense of responsibility to see that he made every effort to take delivery of the goods consigned to him with reasonable despatch, as provided for in the Institute Cargo Clauses (War-Time Extension).

As matters stand at the moment, it seemed to him it makes little difference to a consignee whether or not his cargo arrives intact, because underwriters are guaranteeing his profit, and it is this item of profit which should be eliminated from theft, pilferage and non-delivery claims.

Detailing the individual committees which had been set up to examine this problem, the speaker first mentioned the committee, known as the Cargo Losses and Damage Committee, which was originally formed in December, 1942, following discussions between the Ministry of War Transport and the British shipping industry, represented by the Chamber of Shipping and the Liverpool

Theft and Pilferage at Ports—continued

Steam Ship Owners' Association. Separate committees were set up in London, and at Liverpool, Glasgow, and the Bristol Channel ports, and at times these committees co-opted the representatives of the Government Departments, and the owners or agents of tramp steamers who had special local knowledge. During 1944 steps were taken, through the existing Cargo Losses and Damage machinery, to set up, at the ports mentioned, sub-committees comprising, in addition to the interests represented on the main committee, representatives of the port authorities, and police, employers' organisations, and complementary forms of transport such as lightermen and wharfingers.

It was his understanding that as a result of the deliberations of these various committees, a number of recommendations had been made to shipowners. Some of those recommendations were as follows:—

(a) The provision and effective use of locking bars to prevent access to holds.

(b) The construction of lock-ups to accommodate cargo especially liable to pilferage.

(c) The effective control of keys, i.e., measures to prevent easy access to collections of keys conveniently identifiable by an intending thief.

(d) Blocking of possible entry to holds, e.g., ventilators, tonnage openings, etc.

(e) Establishing the master's personal responsibility for the cargo carried in his vessel.

(f) To institute watching patrols during the hours when loading and discharging is not being carried out.

(g) Surprise, as well as routine, inspection of crews' quarters with the object of discovering pilfered cargo.

(h) Placing notices in crews' quarters calling attention to the serious implications of pilferage from the point of view of the industry; and warning seamen and firemen that, in dealing with offences, owners would invoke the full rigour of the law.

(i) To prosecute and to engage the services of a lawyer of sufficient standing to secure that adequate penalties were imposed upon the convicted.

(j) To report to the port manager of the National Dock Labour Board any stevedore or dock worker found guilty of pilferage with a view to his discharge from the register.

All these recommendations, Mr. Mummery pointed out, only concerned losses that might occur on board, whether in port or on passage. That of course was quite proper, for the shipowners' organisation could only be expected to legislate for the period during which cargo was under the shipowners' jurisdiction, but, in addition to bringing those recommendations to the notice of shipowners, the London Committee had also endeavoured to encourage other transport interests concerned with transit through our ports to take similar precautionary measures.

Reviewing the matter from another angle, and at the instigation of the London Committee, a group of prominent liner companies had established a pool of cargo watchers to act in a supervisory capacity, and the results achieved by that organisation had proved eminently satisfactory to the companies concerned. In Liverpool, the interests affected organised a pool of supplementary dock police to be available in a supervisory capacity, but he believed that the man-power situation had latterly adversely affected that scheme. Approaches had also been made to the Officers' (Merchant Navy) Federation, and the National Seamen and Firemen's Union, both of whom had given their willing co-operation.

The fact remained that in spite of all the work of these committees, theft and pilferage was rampant in practically every part of the world. It had interested him therefore to read a letter in *Lloyd's List*, of October 10th, 1947, under the heading " Prevention of Pilferage—the need for supervision and tallying "—signed by " C. B. H.", in which the writer put forward what he regarded as a condition precedent to tackling the problem, namely the checking of merchandise at each point where the custody changed, adding the following very apt enquiry: " How can the ailment be treated until it be located? " The writer went on to say that at some places, both in this country and abroad, the port authorities appeared to do their utmost to avoid any " ex-ship " out-turn being recorded. Tallies taken after landing, sometimes long after discharge from ship, were not in fact the ship's out-turn, certainly not in these dishonest times.

It was with special pleasure, therefore, that he learned towards the end of last year that in Liverpool, on the initiative of the Board of Social Science and Administration of the University of Liverpool, with the support of the Liverpool Chamber of Commerce, a Theft Committee had been set up, which was representative of all sections of the trade in any way connected with the shipment and receipt of cargo. He understood, too, that the appropriate Government departments were being invited to take an active interest in the affairs of that committee, which was under the chairmanship of Mr. Graham White. He believed it had at its disposal a permanent secretary with the idea of producing a report regarding theft and pilferage generally in the British Isles.

He would emphasise that this Committee would be representative not only of those connected with the shipment and receipt of cargo, but also of the manufacturers themselves, and of the wholesale and retail distributors. Its initial object was to ascertain the facts relating to theft, particularly the extent of the losses which were being incurred. Very little was known at present regarding the amount of the loss over the country as a whole, and it was felt that a full knowledge of the facts would emphasise the gravity of the present situation.

It was proposed that the committee should embrace representatives from all parts of the British Isles. On the other hand, they were equally concerned with the tremendous amount of theft and pilferage which was occurring overseas, and he would like, therefore, to respectfully submit that that new committee directed its attention to that much wider field.

He considered the correct approach was first of all for representatives from the separate committees which had been set up to amalgamate in the form of one main committee and, by so doing, to pool their knowledge and experience. One of the first items on the agenda of that newly-formed main committee should be to consider the possibility and practicability of setting up a world-wide organisation to supervise the loading and discharge of cargoes, particularly those cargoes, which, by reason of shortages, were in demand, and which could readily be absorbed by a black market. To that committee he would suggest there be invited representatives from the new Institute of Packaging, because undoubtedly bad and indifferent packing by itself encouraged pilferage.

Mr. Mummery then quoted from an article which Mr. Harold Jackson, President of the American Institute of Marine Underwriters in New York, subscribed to " Fairplay's " Annual Insurance Number, dated 30th October, 1947. In this article Mr. Jackson said:

> " Practically every report received from all over the world by underwriters here contains the words ' theft and pilferage continue to be rampant in this port.' These reports are borne out by the volume of claims due to theft, pilferage and shortages. The underwriters here are co-operating with the steamship owners and other interested parties in an effort to effect an improvement in the situation in the Port of New York, and the Bureau for the Suppression of Theft and Pilferage, which was originally set up after the last war, has been revived and is now operating with well-trained personnel under the supervision of a well-known former Federal Bureau of Investigation executive."

Not unnaturally, this important matter is one which was discussed very fully at the recent Conference of the International Union of Marine Insurance at Cannes, and it is gratifying to know that the Council then unanimously decided to give effect to the suggestion he had already mentioned, viz., that in effect a " parent Committee " should be set up in each of the countries which had delegates at the Conference, representative of all the interested parties, with a view to discovering ways and means by which this growing evil can be combatted.

In conclusion, Mr. Mummery said that he hoped therefore, that before long we shall find such a Committee in being in this country, and, that it would have, as its members, representatives from the Chamber of Commerce, Chamber of Shipping, the Institute of Packaging, delegates representing Shipowners and Port Authorities, Police, Employers' Organisations, and complementary forms of transport such as Lightermen and Wharfingers, besides delegates from any other interested parties.

Dock and Quayside Lighting

By C. H. NICHOLSON, M.I.E.E., M.I.Mech.E.

(Continued from page 261)

Coaling Appliance Lighting

Coaling appliances comprise coal Hoists, Conveyors and coaling Staiths, all of which require lighting at the delivery point, i.e., where the coal is delivered to the hold of a vessel being loaded. The lighting requirements are as follows:—

An intensity of 2 to 4-ft. candles on the deck of the vessel adjacent to the hatchway, a similar intensity on the delivery chute, and in the case of a coal hoist upon the moving platform carrying the wagon. In addition, local lighting giving an intensity of up to 2-ft. candles is required for the illumination of walkways, platforms and areas adjacent to capstans.

Conveyors require, in addition, adequate lighting (1 to 2-ft. candles intensity), in conveyor tunnels and at the point where the coal is tipped into the hopper serving the conveyor belts, the dispersive prismatic fitting being extensively used for this purpose. (See Fig. IH).

For the purpose of illuminating delivery points of coal hoists, staiths and conveyors where at all possible, the most satisfactory method is by highly concentrating or projector fittings mounted at the top of the appliance and arranged to illuminate the tipping table and chute. The provision of more than one lamp usually placed at each end of the horizontal diagonal bracing tends to eliminate shadows. The lamps used are tungsten of high candlepower from 500-watts to 1,500-watts and candle foot values of 2 to 4 are readily obtainable on the working plane. A very defined light cut-off is essential to prevent glare which would cause considerable inconvenience to ships approaching the appliance.

Capstans and walkways adjacent to the appliance are dealt with by local lighting. Inspection hand lamps preferably supplied by low voltage transformer are desirable.

[Photo by courtesy of General Electric Co., Ltd.

Fig. 11.—Coaling Appliance Lighting.

Example of Coaling Appliance Lighting (as Figs. 11 and 12).

Type of fitting	Projector with refractor glassware mounted on brackets for orientation and provided with focussing facilities.
Mounting Height	64 feet.
Optical Control	Silvered Glass Reflector.
Lamps	500 watt gas filled tungsten filament lamp and 150 watt ditto.
Maximum Candle Power	500 watt. 20,000 candlepower 150 watt. 5,000 candlepower.
Beam Angle	30°

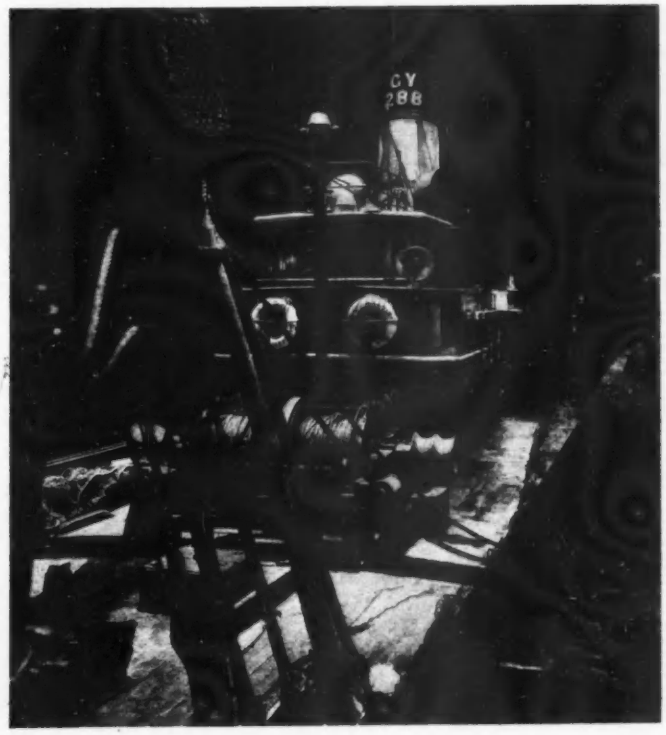
Maximum intensity of illumination on deck of vessel 7 candle feet.
Minimum intensity of illumination on deck of vessel 5 candle feet.

Warehouse Lighting

This may be regarded as necessary for the following purposes:

To enable (a) loading and unloading at the Quay adjacent to the warehouse, (b) stacking and storing operations within the warehouse to be carried out, and in addition, (c) the provision of patrol lighting.

The intensity of illumination required for (a) and (b) depends upon the contrast between the colour and size of the goods being handled, and the warehouse floor and walls. A small object giving



[Photo by courtesy of General Electric Co., Ltd.

Fig. 12.—Coaling Appliance, showing Illumination on Trawler Deck.

a poor contrast requires a very high intensity for recognition, whereas a large object having a good contrast requires only a low intensity.

The contrast between the colour of the goods handled in the warehouse, and the warehouse walls and floor which are usually dark in colour, is not too good, but the average size of the goods handled in dock warehouses may be regarded as being fairly large. Hence the illumination intensities of from 2 to 4 foot candles is ample, where the usual type of goods are being handled, e.g., from ship to warehouse for storage purposes. Where, however, sorting or Customs inspection is necessary, then intensities of from 5 to 7 foot candles are adequate. Using the fittings shown in IA to ID and adopting the correct spacing ratios at mounting heights of from 12 to 15-ft., the lamp lumens required per sq. ft. of floor space to give an intensity of 1 foot candle are very approximately 2.5.

The intensity of illumination required for patrol lighting (c) is from .5 to 1 foot candle.

The choice of the type of lamps to be used requires some consideration as colour perception may be required for the identification of goods labels, which, as previously indicated may present some difficulty if discharge lamps are used.

The suitable type of fitting is dispersive or concentrating reflector type dependent upon the available mounting height.

Dock and Quayside Lighting—continued

The control of the lighting is usually from centralised switchboard with local switch control of the working lighting, guide lighting being operated by separate switches adjacent to entrances.

Data of a typical warehouse lighting installation is given below:

Length of warehouse	326 feet.
Breath of warehouse	50 feet.
No. of lighting units	15
Wattage of each unit	200
Fitting as	8A
Watts per sq. ft.	.195
Lamp lumens per sq. ft.	2.5
Average illumination intensity	1.5 footcandles.
Width of Quay adjacent to warehouse ...	38 feet.
No. of lighting units outside warehouse ...	6
Wattage of each outside lighting unit ...	200
Fitting as	8F
Watts per sq. ft.	.097
Lamp lumens per sq. ft.	1.3?
Average illumination intensity	.5 footcandles.

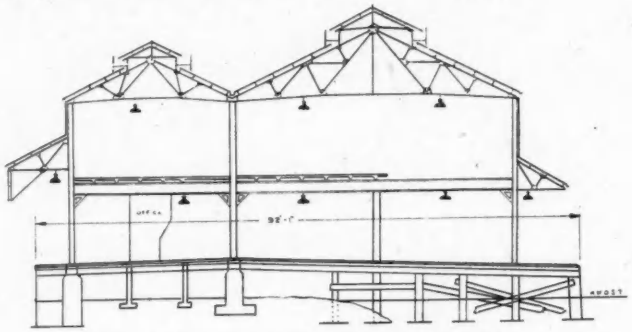


Fig. 13.—Typical Cross Section of Fish Quay.

Grain Silo Lighting

The essential areas to be lighted in a grain silo are the tunnels in which are installed the intake conveyor belts, the distribution chamber where the grain is transferred to the elevators, the weighing and cleaning floors, the distribution floor at the top of the Silo where the grain is delivered to the Silo bins, and the delivery floor where the grain may be delivered to craft, rail or road vehicles in bulk or sacks.

Owing to the inflammable nature of grain dust, all fittings, switches, etc., should be gas tight and all lighting fittings are therefore provided with glassware fitted with rubber gaskets.

Guide lighting, preferably group switched, is essential, and may have an intensity of from 0.5 to 1-ft. candle.

The lighting of all floors may be carried out by dispersive or concentrating reflector fittings provided with gas-tight glassware, the type selected being dependent upon the mounting height and designed to give an intensity of illumination on the working plane of approximately 7 foot candles. A suitable fitting is shown in Figure IK, this being provided with a double glass envelope as an additional safeguard against the risk of explosion.

Generally, the design of the lighting of Silo floors is similar to that of warehouse interiors.

For the purpose of inspecting grain whilst in the Silo bins, portable gas-tight hand lamps which can be lowered into the silo bins are provided. These are preferably supplied for a low voltage source, obtained from combined switch-plug and transformer where A.C. is available. The cable serving the hand lamp is preferably metal sheathed, the sheath being earthed. It is also important that the smallest fuse possible is used. The above remarks generally apply to all hand lamps used in the silo building, the usual voltage employed being 25-volts, the secondary of the transformer being centre tapped, thus giving 12.5-volts to earth only.

Fish Quay Lighting

The requirements of an installation for the lighting of fish quays where fish is landed from trawlers, sorted, sold, filletted and packed are as follows:—

(a) For the purpose of lighting the landing area on the Quay adjacent to the moored trawler an illumination intensity of from 5 to 7 foot candles is desirable. This may be obtained by the installation of dispersive fittings provided with gas-filled tungsten filament lamps of adequate wattage fixed to the principles of the Fish Market structure, and arranged to illuminate both the landing quay and the trawler deck, with a mounting height of about 20-ft. and spacing of from 30-40-ft.

(b) The provision of adequate lighting at the sorting and filletting area which should have an intensity of from 5 to 10 foot candles, may be obtained by the use of dispersive reflector fittings correctly spaced and provided with Gas-filled Tungsten Filament Lamps of adequate wattage.

(c) Patrol Lighting having an intensity of approximately .5 foot candles may be provided by the use of dispersive fittings mounted on the Fish Market Roof Trusses, and spaced a distance equal to about six times the mounting heignt.

Separate control switches installed at each end of the Fish Quay and arranged that the lighting may be switched " on " and " off " on either end of the Quay are desirable.

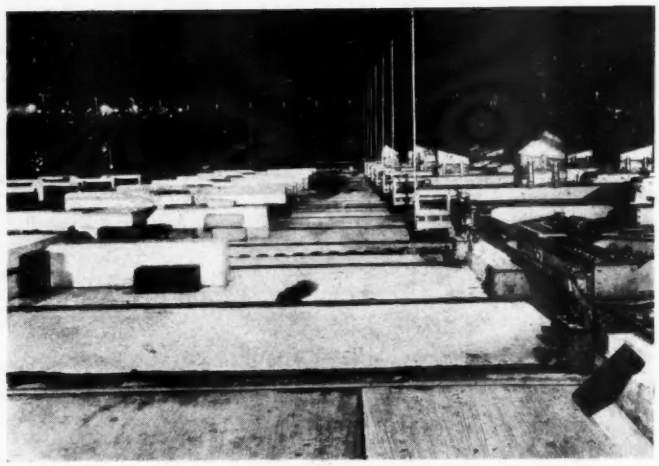
(d) The lighting of the kit stores, box stores and Fish Merchants' Offices may be provided by small Gas-filled Tungsten Filament Lamps.

(e) A similar installation to (a) for the purpose of delivering to road vehicles.

A typical section of the Fish Quay or Market in shown in Fig. 13.

The Technical details of the installation are given below:—

Length of Fish Quay	1,380 feet.
Width of Fish Quay	90 feet.
(a) Quay lighting for Fish Landing.	
Number of lighting units	30
Type of fitting	dispersive reflector.
Wattage of lamps	200
Intensity of illumination in landing area	12 foot candles.
(b) General lighting.	
Number of lighting units	122
Type of fitting	dispersive reflector.
Wattage of lamps	200
Type of lamp	Gas filled tungsten filament.
Lamp watts per sq. ft.	197
Lamp lumens per sq. ft.	2.68
Intensity of illumination in filletting area	12 ft. candles.
(c) Patrol lighting.	
Number of lighting units	9
Type of fittings	dispersive reflector.
Wattage of lamps	200



[Photo by courtesy of General Electric Co., Ltd.

Fig. 14.—Illumination of Slipways.

Slipway Lighting

A slipway is essentially an inclined plane provided with rails and cradle whereby trawlers and similar craft may be hauled out of the dock for repairs.

Lighting is necessary to enable the vessel to be sited on the cradle and during the hauling operation. In addition, portable lighting

Dock and Quayside Lighting—continued

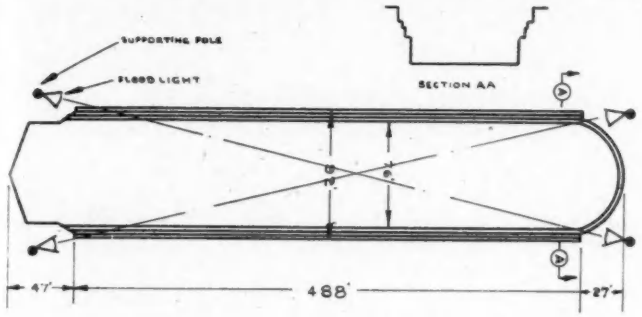


Fig. 15.—Plan and typical Section of Graving Dock.

during repairs is necessary and this is given preferably at low voltage from suitably placed plugs and sockets which should be of the watertight pattern.

Whilst lighting by dispersive fittings mounted on standards installed at each side of each slipway is a feasible method, the use of projector or flood-lighting has much to recommend it, as obstructions in the form of lighting standards are thereby obviated.

The lighting units are usually installed on standards erected at the land end of the slipway and facing towards the water area as indicated in Fig. 14.

An intensity of illumination of about 0.5 lumens per sq. ft. is satisfactory.

Examples of Slipway Lighting

Length of slipway 170 feet.
Width of slipway (10 berths) 400 feet.
Heigth of floodlight above ground 14 feet.
Lamp:—standard 200 watt tungsten.
Optical control Parabolic silvered glass reflectors, provided with front heat resisting glassware, and universally adjustable bracket.
Number of floodlights 11.
Beam angle 30°.
Maximum candle power 7500.
Average illumination .4 candlefeet

Graving Dock Lighting

This presents a similar problem to that of slipway lighting, and a Graving Dock Lighting installation may be divided into three sections.

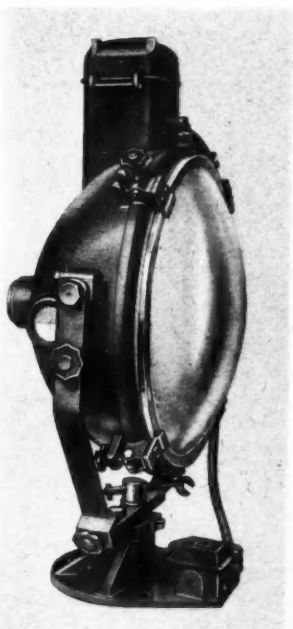


Fig. 16.—Flood Lighting Fitting.

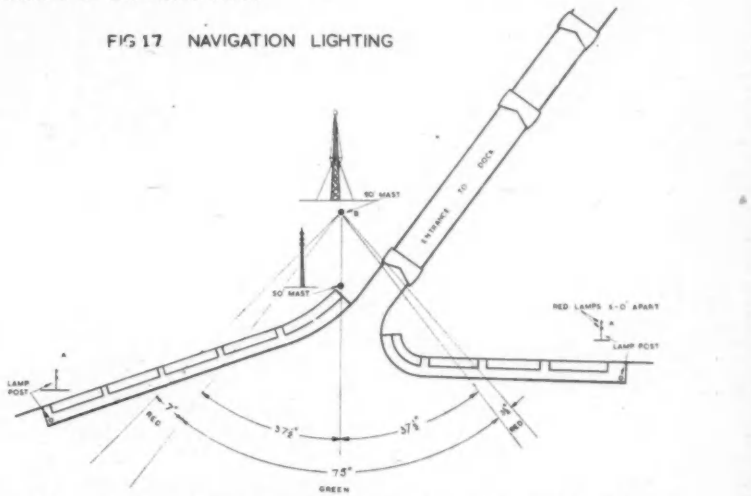
(a) General lighting arranged in order to illuminate the Graving Dock bottom to an intensity of .5 to 1-ft. candle.
(b) General lighting for the purpose of illuminating the area adjacent to the Graving Dock to an intensity of .5 to 1-ft. candle
(c) Portable lighting for the purpose of illuminating the shell and interior of the vessel during actual repair operations.

(a) This is conveniently carried out by the installation of projector fittings provided with Gas-filled Tungsten Filament Lamps preferably of the projector type of adequate wattage. The fittings should be mounted 30-40-ft. high at each end of the Graving Dock, the projectors facing each other and having a beam angle of about 20°. This method obviates the installation of lighting units mounted on poles adjacent to the Graving Dock Coping which are always subject to damage and cause obstruction.
(b) The lighting of the area adjacent to the Graving Dock is usually carried out by means of dispersive fittings mounted approximately 20-ft. high in a similar manner to roadway or Quay Lighting, the only additional proviso being that they should be installed at a sufficient distance from the Graving Dock coping in order to obviate obstruction and damage.
(c) The electricity supply for the portable lighting is conveniently provided by means of switch plug boxes installed at ground level adjacent to the coping, each lighting unit consisting of a parabolic type fitting and having means of attaching the fitting to the repair trestles or hull of a vessel.

An additional alternative is fittings mounted on portable tripods which can be placed in suitable positions to afford light where it is required.

Tough Rubber-sheathed cable provided with an earth core is used to convey current from the switch plug boxes to the lighting units, the fitting and any attachment thereto being efficiently connected to the earth core.

FIG 17 NAVIGATION LIGHTING



It is very desirable where possible to utilise low voltage transformers for the purpose of affording electric supply to portable lighting units in order that the operating voltage may not exceed 50-volts.

The Technical details shown on Fig. 15 are as follows:—

Length of Graving Dock	488 feet.
Width of Graving Dock	92 feet.
Number of Projector units	4
Wattage of each projector lamp	1500
Lamp lumens per sq. ft.	2.5
Average illumination	1 ft. candle.
Number of switch plug boxes for portable lighting type of projector fitting shewn in Fig. 16.	12

Navigation Lights

It is necessary to provide lights for the purpose of assisting navigators to safely enter docks by night and these may be classified as follows:

(a) Lights, generally coloured, to warn vessels of obstructions such as jetties and piers which flank the dock entrance.
(b) Signal lights to indicate when vessels may enter the dock.
(c) Lights indicating depth of water at that particular time in the dock entrance or channel leading thereto.
(d) Lights covering the dredged area at dock entrance and sector lights.
(e) Lights on high standards providing light to facilitate mooring when penning in or out of docks.
(a) Obstruction lights on piers, jetties, etc., are not standard, each port adopting its own system, but a few examples may be given.

Two lights of type Fig. 17 (a) are mounted about 20-30-ft. high, approximately 6-ft. apart in a vertical plane, the

Dock and Quayside Lighting—continued

optical control being silvered reflector with dioptric refractor and red colour filter, the lamp being a General Service Tungsten of 100 watts. A colour light is most prominent and a past system of two white lights in a vertical plane is being discontinued owing to its similarity for a vessel towing. The two red, or in some cases, two green are adopted so that they may not be mistaken for a vessel's side light. Green lights in many cases are being discontinued, the green for navigational purposes being used generally to indicate "Wrecks."

(b) There is no standard lighting or signalling system for the controlling of shipping, entering and leaving docks, as in paragraph (a) each system of docks adopting its own arrangement of signal lighting, but a few cases may be quoted:

A red light exhibited on a high mast indicates the dock is closed for traffic, but upon being lowered about 6-ft. above ground level then indicates a vessel may enter.

Also, at some ports a green light exhibited from a high mast indicates that a vessel may approach the adjacent pier prior to docking.

Three lights mounted in a vertical plane as shown in Fig. 18 (a) are often used. The desired signal is given by one or more lamps being lighted, this being brought about by a manually-operated switch. A typical example of the signals given is as follows:—

One lamp lighted—"stay out."
Two lamps lighted—"come alongside jetty."
Three lamps lighted—"enter dock."

These lights are generally coloured red, to afford a difference to other shore lighting in the vicinity.

(c) Lights indicating depth of water are not standardised in ports, and no general system is adopted, local customs are prevalent, but a few examples may be given:

(1) White lights in a prominent vertical plane with a dark background are exhibited, the lights being well spaced.

One light indicating in channel or on sill, 16-ft.
Two lights indicating channel or on sill, 17-ft.
Three lights indicating channel or on sill, 18-ft., and so on.

(2) A system of green, white and red lights in a vertical plane indicating depth of water in feet exhibited on a mast near the dock entrance.

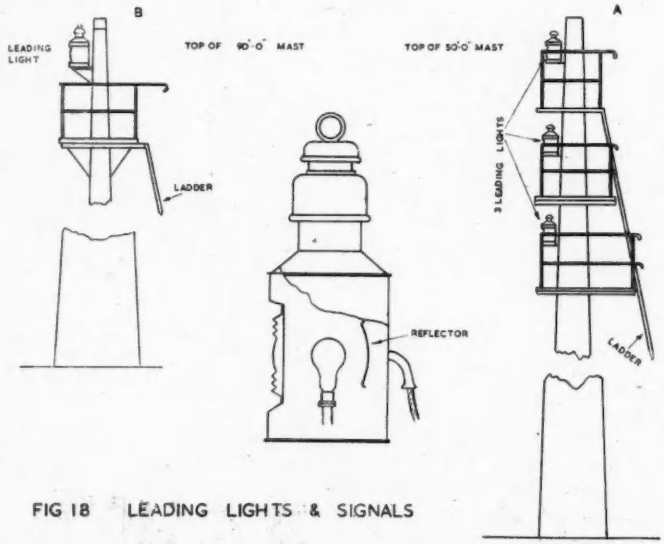


FIG 18 LEADING LIGHTS & SIGNALS

(3) A more modern method is provided by a large prominent clock face marked in feet with the hand as a pointer, the whole illuminated from within and on the outside by a floodlight system.

This latter arrangement is generally accepted as a good type suitable for ports, and may be used more generally in the future.

(d) Lights covering the dredged area are generally of the colour red in a horizontal plane many feet apart, but in most cases these are being substituted by sector lights mounted on standards up to a 100-ft. from ground level as shown in Figs. 18 (b) and 18 (c) and are arranged to show green and red sectors. A vessel entering the red sector continues on a suitable course until the green sector is entered which indicates the vessel is now in the dock entrance dredged area.

The optical control is silvered reflector with dioptric reflector, sector screens, the sectors being fitted with red and green colour filters. The lamps used are four 100-watt general service Tungsten. The visibility in clear weather is approximately 2 miles.

(e) This lighting is, of course, colour white arranged on standards or poles at suitable intervals providing light in a given area to illuminate the part of the quay wall or lock pit wall to enable the mooring of vessels to be carried out efficiently without accident. These lights are shaded by different types of shade so as to afford maximum light in the given area and not to interfere with the eyesight level of the navigator in the dock entrance or lock pit; 100-200-watt clear lamps are generally in use, the intensity of illumination being in the order of 1.5-ft. candles.

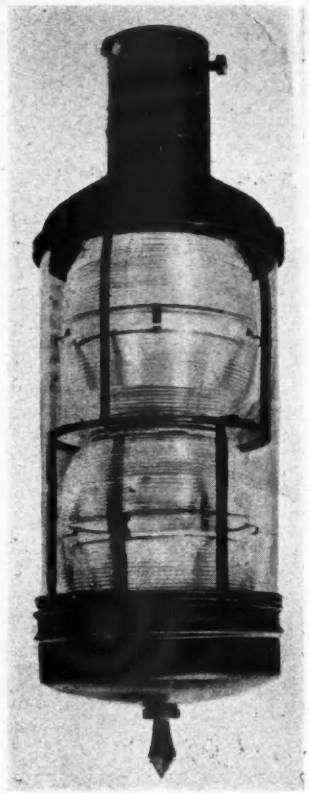


Fig. 19.—Navigation Light.

In order to give particular recognition occulting lights are sometimes used in conjunction with fixed lights and are controlled by a motor-driven switch commutator giving a definite period of darkness, for example, light on, 4 seconds; light off, 2 seconds. Further examples of navigation lights are given below:

Type 1, Fig. 19.

Visible range, nominally 1½ miles minimum.

Method of support: Tubular steel poles 24-ft. high bolted down with flange plate to timber decking.

Lamps: Two standard 150-watt clear glass Tungsten filament lamps (wired in parallel) in each lantern.

Optical control: Four prismatic glass refractors designed to produce a high intensity in the horizontal plane.

The lanterns are constructed mainly in non-ferrous metal and designed to be totally enclosed and dustproof.

Type 2.

Visible range: Nominally 700 yds.

Method of support: Tubular steel poles 11-ft. high bolted down with flange plate on timber jetties.

Lamps: One standard 60-watt pearl tungsten filament lamp.

Optical Control: Interior reflector and coloured front glass.

The lanterns are constructed in heavy gauge sheet copper and made totally enclosed and dustproof.

(To be continued)

Tug for West African Service.

An all-steel tug, built at Poole for the United Africa Company, has been shipped from Southampton to West Africa in the cargo ship Fort Moose. The tug will be employed on the Calabar River towing lighters loaded with groundnuts and palm kernels for export to Britain.

PORT OPERATION

Part 15 of a Series of Articles by A. H. J. Bown, M.Inst.T., A.C.I.S., and Lt.-Col. C. A. Dove, M.B.E., M.Inst.T.

(Continued from page 265)

Dock Labour (6)

Supply and Control. Problems.

In previous chapters we have considered the organisation of ports, the separate functions of the various bodies and trades operating at ports, physical design and layout, the equipment required for handling ships and cargo, the methods of cargo working and the office control of dock traffic. We come now to the important subject of the people who do the work. At the outset, we shall do well to remind ourselves that machinery, buildings and quays, however imposing, are of smaller importance than human beings. Man makes many things, but he makes them all for the service of mankind and, therefore, there is nothing more vital, in the study of port operation, than a proper understanding of the supreme factor—which is the human factor.

Port Jobs and the People Concerned

We have already mentioned many persons and their jobs in connection with port operating. As they are all, in effect, members of one team, it may be useful in maintaining that blessed ideal—a sense of proportion—if we set them all out in one list below:—

Pier master
General Manager
Head Office staff
Traffic Manager
Traffic Office staff
Civil engineer
Mechanical engineer
Electrical engineer
Master stevedores
Dockers
Lightermen
Master lumpers
Master porters
Marine Superintendent
Cargo Superintendent
Ship's clerk
Checkers
Tallymen
Stevedores' foreman
Manifest clerk
Hatchwaymen
Winchmen
Crane drivers
Gangers
Shed clerks
Tractormen
Coopers
Bankriders
Dockmaster
Dock watchmen
Weighers
Dredger men
Quay foremen
Shed foreman
Labour foremen
Foreman sampler
Capstanmen
Grain porters
Timber porters
Teemers
Tacklemen
Shed men
Railway Superintendent
Yardmasters
Railway controllers
Yard foremen
Foreman shunter
Shunters
Loco drivers
Loco firemen
Pilots
Tugboatmen
Foyboatmen
Freshwatermen
Dock watermen
Launchmen
Needlemen
Jetty clerks
Harbourmaster
Dock Police
Carpenters
Dredging Supt.
Painters
Lightkeepers
Fitters
Blacksmiths
Boilersmiths
Masons
Bricklayers
Joiners
Shipwrights
Patternmakers
Electricians
Labourers
Conveyormen
Elevator men
Steamship agents
Forwarding agents
Bunkering agents
Ship chandlers
Graving dockmen
Staithmaster
Staith foremen
Section Superintendent
Port Health Officers
Immigration Officers
Cargo watchers
Lockgate men
H.M. Customs Officers
Trimmers
Lightermen
Warehousemen
Measurers

Numbers and Categories

The number of persons occupied at U.K. ports in the foregoing professions, trades and callings, is of the order of 150,000. Of this total, there are about 74,000 "dock workers." The designation, "dock worker," is now applied to cover the grades formerly and variously known as dockers, stevedores, lumpers, porters, checkers, tallymen, hatchwaymen, lightermen, winchmen, gangers, needlemen, coopers, weighers, measurers, capstanmen, grain porters and timber porters. Broadly speaking, these are the men covered by the old-fashioned term, "docker," and by the new-fashioned term, "dock worker"; and it may as well be said at once that something far more important than the mere change of name has recently occurred. The "docker" was an unidentified, casual man, engaged and paid by the half-day, who might get neither work nor wages for weeks or months together. The "dock worker" is an approved and registered workman who is guaranteed a minimum weekly wage and is entitled to earn, if he can, substantially more than his guarantee.

He works principally in the holds or on the decks of ships, on quaysides, in transit sheds, or in railway wagons alongside berths: his job is to handle the cargo between the ship and the shore vehicle, lighter or shed—and his activities are led and planned by his ganger, the stevedores' foreman and the master stevedore, who engages him.

It should here be noted that for certain purposes explained later, trimmers are registered and controlled as "dock workers." Trimmers are the men who work in the holds of coal-carrying vessels during the operation of loading cargo. Their opposite numbers ashore, who deliver the coal into the ship, are known as teemers (or tippers or hoistmen). Teemers are not "dock workers." (Trimmers and teemers will be particularly referred to in a later paragraph.)

Again, it should be noted that at some U.K. ports, but not at others, crane drivers are registered as "dock workers," and so also are the workpeople engaged in some of the pitwood yards located on dock estates.

The administrative, professional, clerical and commercial categories have been described in earlier chapters and their interlocking responsibilities and functions have been dealt with in detail.

The remainder of the 150,000 fall into the following divisions: port operating staff, port maintenance staff, workers in ancillary port services, and officials in the public service.

The operators include crane drivers, railway controllers, shunters, loco drivers, loco firemen, freshwatermen, dock watermen, launchmen, tractor men, lockgate men, jetty clerks, bankriders, watchmen, conveyormen, graving dock men and elevator men. These men work in direct contact with the traffic of the port—that is, the traffic in ships or the traffic in goods or minerals. Consistent with efficiency, safety and accuracy, their concern is to ensure the continuous movement of cargo and, in association with the dockers, the swiftest possible turn-round of vessels. The need for their maximum endeavours was never so vital as it is at this present time of writing.

The maintenance staff, working under their foremen and controlled by the Resident Engineer and the Chief Engineer, take care of the piers, quays, roads, buildings, railways, berths, fairways and channels, as well as all plant, equipment and harbour craft. They are represented in the foregoing list by carpenters, joiners, shipwrights, patternmakers, fitters, blacksmiths, boilersmiths, masons, bricklayers, electricians, painters, labourers, lightkeepers, dredger men and launchmen.

Workers in ancillary port services include lightermen, pilots, tugboat men and foyboat men. Their respective functions have been previously described.

Officers in the public service whose work lies in port areas include those of H.M. Customs, the Ministry of Transport, the Port Health Authority and the Immigration Department. Their duties and responsibilities have been dealt with in earlier chapters.

Regulation of Wages and Service Conditions

A port is a place where many trades meet, old traditions are respected and die hard, and change is gradual. In consequence, the machinery of wage negotiation and the arrangements for consultation between managements and workpeople, are neither rigidly uniform throughout the country nor free from complexity in any given port.

The tradesmen employed in the port authority's maintenance department are usually represented in industrial negotiations by

Port Operation—continued

the particular Trade Union appropriate to their trade. Thus, the Chief Engineer and his principal assistants—or the Staff Department in large ports—are accustomed to collaborate on such matters, as necessity arises, with the local and regional officials of the Amalgamated Engineering Union, the Boilermakers' and Iron and Steel Shipbuilders' Society, the Electrical Trades Union, the United Patternmakers' Association, the Shipconstructors' and Shipwrights' Association, the Amalgamated Society of Woodworkers, the Amalgamated Union of Building Trade Workers, the Plumbers', Glaziers' and Domestic Engineering Union, the National Society of Painters, and the Confederation of Shipbuilding and Engineering Unions. The labourers who work with tradesmen are normally covered by the Union of that trade. It is common practice for negotiations to take place, at the national level, between a particular Trade Union and an organisation of employers in that trade. When a settlement is made, and if the award is appropriate to such of the tradesmen as are employed by port authorities, the local official of the Union applies for the award on behalf of his men in the port employ. In ordinary cases, the award is promptly reported to the appropriate Committee of the port authority, and immediately applied. If there are points of difficulty, they are discussed and settled by local conference. Normally the port authority is not a member of all or any of the various Employers' Organisations concerned, but agrees, generally, to observe the awards reached between such Organisations and the different Trade Unions.

Commonly, the main body of general labourers employed in the engineering departments of port authorities are represented by the local official of the Trade Union to which they belong. In some cases, this is the Transport and General Workers' Union. Negotiations are conducted locally and directly between the appropriate official, on behalf of the port authority, and the local Union official, on behalf of the men—and settlements are similarly local in character.

The port authority's operating staff, referred to in an earlier paragraph, are normally workpeople on an hourly time-rate and are paid weekly. The majority of them continue in their respective jobs for long periods of service—some of them, all their working lives. The deduction is that they value their jobs, and, in return, the men themselves are valued and respected by the responsible officials of the port. Their wages and conditions are regulated, in some ports, by direct local negotiation between the management of the port authority and the Trade Union concerned, which, in some cases, is the National Union of General and Municipal Workers; in other cases, the National Union of Railwaymen; and at other places, other Unions. In the case of the Rail-owned ports, the wages and conditions of the weekly staff are regulated by the national joint industrial machinery, which covers all Railway workpeople.

The Dock Workers

These 74,000 workmen, "the dockers," whose well-being, efficiency and willing service are now, more than ever before, of the utmost importance to the national life, are represented industrially by the Transport and General Workers' Union, the National Union of General and Municipal Workers, the National Amalgamated Stevedores' and Dockers' Union, and the Scottish Transport and General Workers' Union. In London, there is also the Watermen, Lightermen, Tugmen and Bargemen's Union.

The national organisation representing the employers is the National Association of Port Employers. Representatives of the first four of the above-mentioned Unions sit together and function together with the National Association of Port Employers as the National Joint Council for the Port Transport Isdustry.

It would be possible, of course, to state baldly the arrangements existing to-day as regards the wages and conditions of service of dock workers, and leave the matter there. But it is felt that, for our present purpose, something more is necessary. The present arrangements cannot be properly understood unless they are set against their historical background. In the following paragraphs, an attempt is made to summarise the development of the matter from its early beginnings, ending with a statement of the leading features of the arrangements in force to-day. First, we give below a table of the main historical landmarks, and we follow this with a brief note upon each of them.

The Outstanding Events

1825—1908	...	Labour under the London Dock Companies
1908	...	Port of London Act
1912	...	Liverpool Dock Scheme
1916	...	The Port Labour Committees
1919	...	The Roche Committee
1920	...	The Shaw Inquiry
1920 1921 1923	...	The Unemployment Insurance Acts
1924	...	The Maclean Committee
1930—1931	...	The Maclean Committee
1931	...	Departmental Committee of Inquiry into Port Labour
1932	...	Royal Commission on Unemployment Insurance
1934	...	The Unemployment Insurance Act
1937—1939	...	Decasualisation proposals
1939	...	War-time developments
1940	...	Dock Labour (Compulsory Registration) Order, 1940
1941	...	Mersey and Clyde Schemes
1941	...	Essential Work (Dock Labour) Order, 1941
1941	...	National Dock Labour Corporation, Limited
1945	...	The Evershed Award
1946	...	The Dock Workers (Registration of Employment) Act, 1946
1946	...	The Forster Inquiry
1947	...	The Cameron Inquiry
1947	...	The Hetherington Inquiry
1947	...	The Dock Workers (Regulation of Employment) Order, 1947
1947	...	The National Dock Labour Board

Labour Under the London Dock Companies, 1825-1908

The demand for labour to discharge and load ships is variable and intermittent. The causes are tide, weather, season, accident, port developments, marketing factors and economic conditions, national and international. In consequence, until recent years, the men offering themselves for the work have been a variable force—including some who "followed the docks" regularly, in good times and bad, and a large fluctuating body of other men who came to try for a job now and again, especially when employment was slack in their own trades. The evils of the system have always been recognised and the history of dock labour during the past 40 years is primarily concerned with the efforts made by the employers, the workpeople and the Government, to find a satisfactory basis for decasualisation.

The old London Dock Companies were pioneers in this work. They were successively constituted by statute during the 19th century and they lasted until the Port of London Act, 1908. They introduced the system of A, B and C men. The A men were permanent dockers on a regular weekly wage; the B men were first-choice casuals or "preference" men; the C men were given jobs, if any, after the preference men.

Port of London Act, 1908

This Act set up the Port of London Authority, in place of the Dock Companies, and the new Authority were required, *inter alia*, to "take such steps as they think best calculated to diminish the evils of casual employment." Accordingly, they continued the system of A, B and C men.

Liverpool Dock Scheme, 1912

Under this scheme, a number of employers in the port joined together, registered all their regular men and gave them preference when work was available. Mobility of labour was provided for amongst the men and employers concerned, wages were centralised and paid weekly and the men's insurance cards were stamped.

Port Operation—continued

Port Labour Committees, 1916

These were committees of the Board of Trade. They secured registration of genuine dockers at U.K. ports in order to reserve them as necessary from military service in the 1914-18 war. The Committees lapsed after the war and, in many places, the registers were not kept up.

The Roche Committee, 1919

After the war, the number of men seeking work at the London Docks, as in other ports, grew disproportionate and unreasonably large. A Committee, under Mr. Justice Roche, recommended a Registration Scheme. This was set up under the Port of London Registration Committee.

The Shaw Inquiry, 1920

In this year, national negotiations on increased pay were attempted between the dockers and the employers, and, when they failed, the matter was referred, under the Industrial Courts Act, to a Court of Inquiry under Lord Shaw of Dunfermline. The results were: (1) a new daily wage of 16s.; (2) a recommendation that registration should be applied everywhere; and (3) a recommendation that the docks industry should accept the principle of its own responsibility for the maintenance of registered men unemployed or under-employed.

The Unemployment Insurance Acts, 1920-21-23

Dock labourers were brought within the scope of these Acts, but several amendments were required to frame a workable rule as to continuity of employment. Ultimately, it was conceded that any three days or more of unemployment (not necessarily consecutive) occurring within a period of six consecutive days, constituted a continuous period of unemployment.

The Maclean Committee, 1924

In this year a new National Agreement was signed. As part of it, the parties invited the Minister of Labour to nominate an independent Chairman to preside over a Committee to explore the possible improvement of registration and the implementation of the Shaw Report. The Minister nominated Sir Donald Maclean, and his Committee urged that the registers be first overhauled and decasualisation be tackled thereafter.

The Maclean Committee, 1930-31

After some years of experience of the working of Unemployment Insurance as it affected dock labourers, the Minister of Labour found the position unsatisfactory and set up a Departmental Committee, under Sir Donald Maclean, to examine the matter and to investigate the possibilities of decasualisation. No result was achieved in the latter direction, but registration was greatly improved. A Standing Advisory Committee was set up, in conjunction with the Ministry of Labour, to secure the revision of all port registers and much good work was accomplished. Better control of labour and a degree of mobility were also introduced by means of central Call Stands and Surplus Labour Stands. Generally speaking, however, the registers remained too large to give good employment to all the men. The policy adopted was to keep down new admissions and leave the rest to time; and one of the results was gradually to raise the average age of registered dockers. This has left its mark on the industry in recent years.

Royal Commission on Unemployment Insurance, 1932

This Body included the port industry in their survey and urged the Minister, failing voluntary agreement, to take power to introduce a decasualisation scheme himself.

Unemployment Insurance Act, 1934

This Act contained provisions which appeared to indicate that if the port employers devised a scheme to take unemployed dockers off the State Insurance benefit, then the State might possibly consider giving financial assistance to any such port industry fund. Protracted negotiations ensued between the Minister of Labour and the port employers, but no settlement had been reached by 1939, when the outbreak of war interrupted the discussions.

Decasualisation Proposals, 1937-39

In 1937 the daily time wage of a dock labourer stood at 12s. (11s. in the smaller ports), to which figure it had declined from the 16s. conceded in 1920. The Trade Unions were concerned over the problem of under-employment and they pressed for an increased rate to compensate for the lack of regular work. The Employers took the view that the proper remedy would be to reduce the over-large registers, but eventually a wage increase of 1s. per day was agreed. It was also jointly resolved to tackle the decasualisation problem afresh, as a matter of urgency.

The Employers formulated proposals accordingly, which included: (1) reduced registers; (2) a guaranteed minimum wage with a four-weeks "spread-over"; (3) non-attendance at recognised calls to be penalised; (4) central reporting offices; (5) employers (with Government help) to finance the scheme; (6) holidays with pay; (7) weekly-engagement men to be outside the scheme.

The discussions lagged because of disagreement over the proposed reduction of registers, the problem of seasonal employment, and the difficulty of establishing a fair relation between State unemployment benefit and the proposed new guarantee.

War-time Developments, 1939

The outbreak of war with Germany threw an abnormal strain on the West Coast ports of Britain and the best use of all available dock labour became imperatively necessary. Surplus labour Stands were revived at Liverpool, to ensure local mobility and full use of all workers, but this measure failed to be fully effective because some employers were not subscribers to the registration scheme. The Dock Labour Committee therefore recommended that registration be prescribed forthwith by Government Order.

Dock Labour (Compulsory Registration) Order, 1940

The Minister of Labour and National Service introduced compulsory registration for the port industry in June, 1940. The Order required a register of employers, and a register of port transport workers, to be made in each of the principal ports; the provision of suitable engagement points; and the restriction of employment, so far as possible, to registered men. Schemes were set up accordingly in all the chief ports, except Glasgow.

To assist in operating the Registration Schemes, the Ministry appointed Regional Port Labour Inspectors, assisted by Port Labour Inspectors in the principal ports. They helped in the engagement, allocation and (where necessary) the port-to-port transfer of dock workers.

Dock Labour Schemes for Merseyside and Clydeside, 1941

Early in 1941 all registered dock workers on Merseyside passed into the direct employ of the Minister of Transport. The national daily time rate had by then risen again to 15s. per day, and the Government gave the Merseyside men the corresponding weekly wage of £4 2s. 6d. as a guaranteed minimum. The men were made mobile within the Mersey area and required to perform any suitable dock work and to work reasonable overtime, including night work. Finally, the Minister undertook to introduce piece rate working where suitable. The registered employers became "approved employers" to the Minister.

Shortly afterwards, the Minister set up a similar scheme on Clydeside.

National Dock Labour Corporation Limited, 1941

With the assistance of the National Joint Council, and an Essential Work Order, the Minister then addressed himself to the task of putting the labour arrangements at all the principal ports on an effective war footing. At the request of the Minister, the Joint Council produced a scheme whereby the normal working week was divided into 11 half-day "turns," and every registered man reporting for work was to receive, for every turn, either his piece-work earnings, or his time-rate earnings, or 5s. (later

Port Operation—continued

6s.) "attendance money" if he got no work. Existing national and local agreements remained in force; piece work was to be adopted for all suitable cargoes; and one week's annual holiday with pay was laid down. Any man earning overtime pay during extended week-day hours (but not night shifts), or on Saturday afternoon, or on Sunday, would not thereby be disqualified from receiving full attendance money for any or all of the eleven ordinary "turns."

It will be noted that the guarantee arrangements were not the same at Corporation ports as at Ministry ports (Mersey and Clyde). At the Ministry ports a man could not receive less than £4 2s. 6d. if he attended for 11 turns, but his overtime earnings (except any for Saturday afternoon) counted against the guarantee; whilst at Corporation ports the guarantee for 11 turns (without work) was £2 15s. 0d. (later £3 6s. 0d.), but any overtime earnings were paid to the man in addition. The National Dock Labour Corporation, Limited, was set up to administer this war-time scheme. They took over, from the employers, the payment of wages. The employers sent details of the men's earnings, together with a cheque for the total, to the local office of the Board once a week. And the employers were required to add to the total, and include in their cheque, an additional percentage (which began at 25 per cent.) to provide the Attendance Money Fund. (The levy later dropped to 10 per cent. and is to-day 15 per cent.) The employers are entitled to recover the amount of the levy from the shipowners and merchants for whom they work.

The Corporation had a National Board and Local Boards in the ports. Both the National and Local Boards had equal representation of employers and workpeople, with the addition on the National Board of a Chairman, Vice-Chairman and Financial Director, all appointed by the Minister.

Essential Work (Dock Labour) Order, 1941

This Order was issued on the 15th September, 1941, and its effect was to introduce the above-described scheme into all the principal ports of Great Britain, except on the Mersey and the Clyde, where the Ministry schemes continued to operate.

The Later War Years, 1941-45

There can be no doubt that the provisional schemes of decasualisation, applied to the port industry under the stress of war, fulfilled their valuable main purpose—namely, more settled conditions and good work in the ports, and the effective prosecution of the war. In 1944, the Government indicated to the Industry that they desired that there should never be any return to casual working conditions and they therefore asked the Industry to produce proposals for a permanent post-war scheme for the decasualisation of dock labour.

The Employers prepared a scheme accordingly, which contained the following principal provisions:—

(1) Control should not be exercised by one national Body but by the statutory Port Authority in each principal port or group of ports. The Port Authority would be the "legal employer"; when at work, the workers would be under engagement to an approved "operational employer."
(2) A guarantee fund (to provide the workers with a regular monetary payment in the absence of work and earnings) would be created and maintained partly by payments by the operational employers (by an addition to their wage bills) and partly by increased dues on goods, to be levied by the Port Authority. The Port Authority would also contribute regularly to a national fund, which would be available to strengthen local Guarantee Funds should need arise.
(3) The guarantee to be £16 per man for every period of four weeks, all earnings to count against the guarantee.
(4) Neighbouring ports to arrange for the interchange of labour on a daily travel basis.
(5) The Government to make a refund to the employers equivalent to the Government's saving in the future payment of Unemployment Insurance benefits.
(6) The Port Authority and the employers in every port to determine and regulate the number of men on the Register.
(7) The Port Authority to be the licensing authority for approved operational employers.
(8) Holidays with pay, welfare arrangements, training schemes for new entrants, and the continued observance of National and local industrial agreements were all stipulated.
(9) The normal working week to be 44 hours, with reasonable overtime when required.
(10) In recognition of their proposed new status as permanent employees on a guaranteed wage, the workpeople should agree to a review of overtime rates, manning of gangs, introduction of mechanical aids with reduced man-power, transfer between jobs, port differential time rates, extra payments for various commodities and various conditions, time-keeping, and arrangements for removing and replacing hatch covers.

National Daily Time Rate

On the 6th March, 1944, the National Daily Time Rate was increased from 15s. to 16s.

The Evershed Award, 1945

In the course of the year 1945, the Trade Unions applied for the national daily time rate to be increased from 16s. to 25s. (By existing agreement, the time rate also operates as a minimum fall-back rate for piece-workers.)

Direct negotiations failed and the Minister appointed Mr. Justice Evershed, with a Committee, to consider the matter. They recommended 19s. a day and this was accepted and applied with effect from the 28th November, 1945. Piece rates were increased correspondingly by 15 per cent. (5 per cent. for every time rate shilling).

Dock Workers (Regulation of Employment) Act, 1946

This measure became law on the 14th February, 1946. It continued the war-time labour schemes until 1st July, 1947, and provided that permanent schemes could be agreed by the Industry for approval by the Minister, or that representative organisations might ask the Minister to make schemes.

The Forster Inquiry, November, 1946

The Trade Unions declined to agree with the Employers' proposals as set out above. In chief, they objected to the proposed control by Port Authorities, and to the conditions attached to the guarantee. The two sides eventually asked the Minister to do the Scheme-making, and he began by appointing Sir John Forster, K.C., to hold an Inquiry.

At the Inquiry, the Employers urged that their proposals, as set out above, should be adopted. They offered, however, to make the guarantee a weekly payment of £4—all earnings whatsoever to count against it. The Employers argued that reduction of the registers—a crucial point—had not, and apparently could not, be secured by agreement and that this problem had defeated even the National Dock Labour Corporation itself. Therefore, they urged, as the Employers would provide the Guarantee Fund, the Employers should decide how many men should be entitled to receive it.

The Trade Unions replied that joint control of the registers was historical and traditional and only under joint control would there be any hope of revising the registers in a peaceable and efficient manner. They also urged that the 11 half-day "turns" should be retained, that "attendance money" should be paid for "no-work" turns, that there should be a weekly guarantee greater than 11 turns of "attendance money" but less than 11 turns of work at the time rate, and that overtime earnings should not count against the guarantee (but attendance money and ordinary earnings should).

Sir John Forster recommended as follows:—

(1) Decasualisation schemes should be administered by some National Joint Body through Local or Area Boards.

Port Operation—continued

(2) Port Registration Committees should be abolished and the registers be controlled by the National Board in consultation with the Area Boards; reductions or increases to be ordered, as necessary, by the National Board and carried into prompt effect.
(3) Labour should be mobile within daily-travelling distance, and distant transferability should be included in the schemes but deferred in practice until housing and billeting difficulties became less acute.
(4) There should be a weekly guarantee and all earnings whatsoever should be set against it; it should be sufficient to cover minimum needs but not so high as to tempt a man to avoid work.

Hetherington Inquiry, June, 1947

The Forster Inquiry left the actual details of the guarantee unfixed. Against the Employers' offer of a fall-back minimum weekly wage of £4 (all earnings whatsoever counting against it), the Trade Unions asked for attendance money of 6s. a turn and a weekly minimum of £4 16s. 0d., with only attendance money and ordinary earnings counting against it.

The Minister appointed Sir Hector Hetherington, and a Committee of four, to consider the point, and they recommended attendance money of 5s. a turn and a weekly minimum of £4 7s. 6d. attendance money, ordinary earnings and all overtime earnings (except any for Saturday afternoon) counting against it.

These findings were accepted by the industry, with the amendment that the guarantee was fixed at £4 8s. 0d. and week-end earnings were not to count against it.

Cameron Inquiry, May, 1947

The Minister prepared a Scheme and a Draft Order, and, objections having been made, appointed Mr. John Cameron, K.C, to hold an Inquiry.

The Minister's scheme emerged from the Inquiry in the following general shape:—

(1) The objects of the scheme are to secure an adequate number of dockers regularly employed.
(2) The scheme covers the 83 principal ports in Great Britain.
(3) A National Dock Labour Board administers the scheme; the Board consists of a chairman, a vice-chairman, and 8 or 10 other members. The employers nominate 4 members and the workpeople 4 members; the Minister selects the others (if any). The Board is supremely responsible for the registers of workpeople and of employers; for the training and welfare of the workers; and for charging the costs of the scheme to the employers.
(4) There is a Local Dock Labour Board in each port (or group of ports) with equal representation of employers and workeople. The National Board delegates many of its powers and functions to the Local Boards.
(5) Wages, conditions and holidays with pay shall be in accordance with current agreements, national or local.
(6) A guaranteed minimum weekly wage shall be paid to registered men in accordance with National Joint Council agreements or the Minister's directions.
(7) The National Board will obtain funds to operate the Scheme by requiring every employer to pay to them a percentage levy calculated on the gross wages he pays to the men. The Board cannot impose a levy greater than 25 per cent. without first consulting the Minister and considering his observations.

The Dock Workers (Regulation of Employment) Order, 1947

The Minister made this Order on the 16th June, 1947. The Order set up the National Dock Labour Board forthwith and the Scheme came into full operation at the end of that month.

It should be noted that the machinery of the Labour Board is quite apart from the conciliation machinery of the industry, represented by the National Joint Council for the Port Transport Industry and the Local Joint Committees in the ports.

Summary of Historical Review

It will be seen from the foregoing paragraphs that the wages and conditions of the dockers have received a very large amount of detailed examination since 1908. However, the long and arduous approach to permanent decasualisation is now over—decasualisation is the order of the day. The necessary task of adjusting the registers is well advanced, and, provided that the volume of business in U.K. ports remains reasonably good for a term of years, the new conditions now established should make for good work, good order, and a contented and efficient labour force.

To conclude this chapter on dock labour, we set out below a few notes on points not dealt with in the foregoing or in amplification of matters only briefly touched upon above. The paragraphs to follow will refer to: (1) piece work; (2) port transport workers on permanent weekly engagement; (3) welfare; (4) teemers and trimmers; (5) pilots; (6) tugboat men; and (7) foyboatmen.

Piece Work

During the war years, piece rate working increased at U.K. ports. Prior to the last war, it usually applied only to certain homogeneous commodities (e.g., grain, iron ore) and not always to them. A few places, however, such as London, have a long-established piece rate tradition for nearly all classes of work. The war-time extension of the system brought about the application of piece rates to the loading or discharging of mixed general cargo—work which was generally regarded for many years as an essentially time-rate job.

In discussions between employers and workpeople, when the making of a new piece rate is being debated, the suggestion is sometimes heard that the rate should be so fixed as to yield a return to the dockers 50 per cent. better than they would get at the time rate in any given period. This is one assessment of the enhanced reward due to a man putting forward a piece-worker's effort as against a time worker's.

It is sometimes maintained by port employers that piece-work is expensive compared with time work, but there is no doubt that the performances put up by keen, willing gangs of piece-workers are frequently remarkable. But if the employer is also to get some benefit (and if the country as a whole is to get some benefit, too), then it is necessary that there should be an unbroken flow of cargo to or from the ship, and that there should be another ship (with cargo and land transport in readiness) to place in the berth as soon as the first ship is finished. For it is clearly not to the general advantage if higher wages are paid for faster work, only to result in the men having to stop frequently, waiting for cargo or for transport, or if two days saved on the first ship are spent in idleness because there is no second ship ready to follow.

To these contentions the workmen are entitled to reply that such results are not caused by piece-work, but by failures in the organisations respectively responsible for the disposal of cargo and the stemming of ships. There is some obvious truth in this, but there will always be the factors of weather, tide and season (to name only three out of many) militating against the theoretically desirable continuous flow of cargo and swift succession of ships. Nevertheless, a ship turned round faster means a ship at work longer on her only proper business—namely, the sea carriage of merchandise or passengers.

It should be borne in mind that the same worker may put in part of a week on a time job, part on a piece job and one or more turns on "attendance money." It has been roughly computed that during the war the proportion of work done on a piece basis was worked up to about 80 per cent. of all the work in U.K. ports, leaving 20 per cent. on a time basis. Since the war, there has been some reversion to the time basis, so that the proportion may now be (or tending towards) 60 per cent. piece work and 40 per cent. time work.

Port Transport Workers on Permanent Weekly Engagement

The National Labour Scheme envisages and includes a certain number of men on permanent weekly engagement. At the end of the war, the total register was reckoned as 74,000 (reduced

Port Operation—continued

from about 90,000 in 1938) and, of these, about 11,000 were permanent men. There are about 6,000 permanent men in the Port of London and the balance are spread about the country. Many of them are employed by quayside warehouse keepers and as ship and shore workers by shipping companies. An arrangement sometimes obtains whereby they receive piece rates for ship work and time rate in the warehouse. The employer pays a lower levy on the wages of permanent men and he must undertake to keep them so graded for a minimum period of six months.

Welfare

The provision of dockside canteens for port transport workers received considerable impetus during the war and their availability is now widespread and highly valuable. Port medical services for the dockworker have also been set up in many places and, at others, their institution is proceeding. The National Scheme orders the provision of such services, and Welfare Officers have been appointed and are functioning under the National and Local Boards.

Teemers and Trimmers

The teemers (or tippers or hoistmen) are not registered dock workers. They are employed as weekly operating staff by the proprietors of the staiths at coal shipping ports. The proprietors include British Railways, the National Coal Board and the Port Authorities. The Railways are the principal employers, and the national negotiating organisation is the Railways Staff Conference. The workpeople's side of this Conference consists of representatives from the National Union of Railwaymen and the Transport and General Workers' Union. The men are piece-workers with a minimum guarantee.

On the other hand, the trimmers are registered in the National Scheme as dock workers and they are available, to a limited degree, for work on suitable types of cargo other than coal. Their wages are paid to them by the shipowners, and their conditions of service and rates of pay are commonly regulated by agreed scales settled between the Shipping Federation and the Transport and General Workers' Union. They are piece workers (with the benefit of the guarantees provided under the National Dock Labour Board scheme) and they are allocated to the different shipping points at U.K ports, according to arrangements agreed between their Union, the Shipowners and the Staithowners.

Pilots

The training, appointment, conditions of service and remuneration of pilots have been dealt with in an earlier chapter. They work on a rota under the control of the Pilotage Authority of their district. The Pilotage Authority is commonly a consortium of persons representing the shipowners, the port authority and the pilots themselves. Their immediate superior is sometimes known as the Pilot Ruler and in some places, but not all, he doubles the office of Secretary to the Pilotage Authority. Their activities are generally regulated by statute—namely, the Pilotage Act, 1913. Their remuneration is settled by a local tariff, which takes into account the draught of the ship, the distance navigated and special circumstances.

Tugboatmen

These men are employees of the firms or organisations owning the tugs. The towage service at ports is usually supplied by private firms of contractors, but sometimes by the port authority. Commonly, the men join the service young and take their turn for promotion in it. Wages and conditions of service are settled locally and direct between the owners and the men's organisation.

Foyboatmen

These are the harbour boatmen who earn a living by giving assistance to ships in connection with mooring and unmooring. Their job is to handle the ship's ropes and secure them or release them from quay bollards or river buoys. They are often controlled by a local Association, organised and empowered by themselves; and they are remunerated according to a tariff settled between themselves on the one hand, and the shipowners' and steamship agents' organisations on the other. At some places, the port authority has the power of licensing foyboatmen.

Acknowledgments and Further Reading

In preparing the foregoing notes, the authors have relied extensively upon the documents issued in connection with the post-war official inquiries. They have also made use of the various Acts, Orders and Reports mentioned in the text, and they recommend these to all students for detailed study.

Dock and Harbour Authorities' Association

Excerpts from Presidential Address at Annual Meeting

Presiding at the Annual General Meeting of the above Association, which was held on 18th February last, The Rt. Hon Sir John Anderson, M.P., President of the Association, commented briefly upon some of the topics which were of general interest to the members.

Sir John Anderson said that the event during the past year which for the Association overshadowed all other matters, was the passage into law of the Transport Bill. They had made it clear that they were not at all enamoured of the provisions of the Bill as first introduced. During its passage through Parliament, however, their views and criticisms were met to an extent and in a way which rendered it much more acceptable. In particular they welcomed the statements made by the Minister, and on his behalf, showing how far he agreed with their view of the importance of maintaining under the new conditions the individuality, and, within wide limits, the autonomy of the various ports or port systems. Now that the Bill had become law it was their clear duty to offer the fullest co-operation to the Minister, the Transport Commission and the Docks and Inland Waterways Executive, and to do everything in their power to make the scheme a success.

There was one immediate consequence of the passage of the Bill which he was sure they must all regret, and that was the withdrawal from their organisation of the railway ports which had been in association with them since 1943. This decision had been taken on technical grounds in view of certain of the functions of the Transport Commission and the Docks and Inland Waterways Executive under the Act, but he still hoped that it may not be irrevocable.

Referring to the question of war damage, he said this was still a live issue although great progress had been made during the past year towards a settlement. Docks and harbours, with other public utilities, were excluded from the main War Damage Act, not on any ground of principle, but for technical reasons: the Schedule " A " basis of contribution adopted for the purposes of that Act being held to be inapplicable to the circumstances of the undertakings in question. It was always clear that the further legislation necessary to bring public utilities within the scheme would have to provide for applying, by whatever method might be most appropriate to their circumstances, the basis principles of the main Act, namely, a complete pooling of risks over the whole property-owning community, each owner paying into the general pool a contribution based solely on the value of his property at risk, and therefore unrelated either to the damage actually suffered or to the degree of risk to which it might have been exposed.

In the discussions that had taken place with a view to arriving at a settlement, so far as dock and harbour undertakings were concerned, three main problems had had to be dealt with: (1) the basis on which damage should be assessed, (2) the most appropriate method of calculating the global contribution to be paid by the whole group of dock and harbour authorities, and (3) the determination of an equitable basis for the apportionment of such

Dock and Harbour Authorities' Association—continued

global contribution among the individual authorities concerned. On the first and third points agreement had been reached, and, in regard to the second point, he had just learned that the Treasury had accepted the Association's submission that contributions should not exceed an amount equivalent to 10 per cent. of the damage suffered.

Turning to the question of the handling of explosives in port, Sir John said that during the war, the normal safeguards applicable in time of peace had of necessity to be somewhat relaxed. It was their view that they had come when all those safeguards should again be applied, and should there be any reluctance on the part of the Government Authorities concerned to accept this view it would be their duty to make strong representations in the very highest quarter. Most of them had a recollection of the disastrous explosion in Bombay Harbour during the war, and, more recently, they had accounts of widespread devastation in Texas City and in Brest Harbour. The question was not only one of avoiding loss of lives and property, important though those considerations were, the set-back to national recovery if our port facilities were put out of action to any material extent, constituted in present circumstances a further argument of the utmost cogency against the acceptance of any avoidable risk.

The Association had welcomed during the past year the further emphasis laid by the Minister upon the importance of doing everything possible to speed up the turn-round of ships in ports as by far the most effective means of increasing the carrying power of our depleted mercantile marine, and meeting in full the requirements of our expanding export trade. Working parties had been visiting the various ports to discuss with their representatives on the spot all practicable measures to this end, and the port authorities on their side, had found it necessary to call attention to the serious shortages both of labour and of materials which were still hampering their efforts, particularly where severe war damage had been sustained. They hoped that the Minister with the reports of those Working Parties before him would see his way to use his influence with the departments concerned, so that those ports which were now having to deal with the pre-war volume of traffic with greatly reduced facilities would have the greatest possible assistance.

In conclusion, Sir John referred to the prevalence of crimes of dishonesty, and in particular to the increasing losses due to pilferage at the ports—losses which fell ultimately upon the community as a whole. The method of tallying by which goods were checked at the various stages of handling was of obvious importance, and at the instance of the Treasury Solicitor, the Association, in consultation with representatives of Shipowners and Protection and Indemnity Clubs, had been examining systems in force at a number of the principal ports for the purpose of ascertaining what improvements can be made in existing practice.

Reviews

Lateral Pressures on Retaining Walls, a Symposium. Proceedings of the American Society of Civil Engineers, January, 1948, Vol. 74, No. 1. Am.Soc.Civ.Eng., New York. Price $1.00.

The U.S. Navy Department, Bureau of Yards and Docks, has had some very valuable experiments carried out at Princeton University, by Professor Tschebotarioff, on the pressure on "bulkheads." The results are now reported and presented with five other papers by the American Society of Civil Engineers.

The five other papers deal respectively with the methods of making the observations in the experiments (by Messrs. E. R. Ward, J. R. Bayliss and P. P. Brown, all of Princeton University); application of test results to quay wall design (by H. Epstein, of the Bureau of Yards and Docks); experiences with soil types in naval construction (by L. A. Palmer, of the Bureau of Yards and Docks); cave-ins of sandy back-fills (by J. C. Gebhard, of the U.S. Navy); and the failure of a quay wall at Mare Island, California (by L. C. Coxe, of the U.S. Navy). Rear-Admiral W. H. Smith (U.S. Navy) gives an introduction.

The two last papers deal with actual experience in naval construction. The first is the case of escape of a sandy fill through sheet piling, and the second of a quay wall movement due to unexpectedly great lateral pressure. In both cases the construction had been carried out with pumped filling and the defects appeared when the material in front was dredged away. In the second case, the site had been dredged out but was refilled before the front was dredged away.

The Princeton experiments were carried out with a model "tank" with an effective head of sixteen feet. Pressures were deduced from the strains and deflections of the "bulkhead" (i.e., sheet piling in usual British practice), checked by pressure cells. The whole purpose was to discover what pressures developed with clay, sand and sand-clay mixture, and how high clay pressures could be mitigated by partial use of sand arranged in various ways. It is indicated that the arching effect, to which Terzaghi has often called attention, does not play a very large part in this particular problem.

All the papers are "informed" by the principles of soil mechanics, which have been developed during the last two decades and show how thoroughly these have been absorbed in American practice. They also illustrate the tendency to apply cut and fill high-speed methods to constructions which in the past were of the heavy masonry type. Such methods can only safely be used if the engineer and designer are quite familiar with the behaviour of alluvial material and, in particular, how its pressure changes with grain size, moisture content and consolidation. The urgency of war requirements played some part in the adoption of these types of construction, but it is certain that they have come to stay, although there are limits beyond which engineers will still prefer the older and more massive work. Economics also enters into the question, since these methods are much cheaper than the old ones but the hazards are higher.

The results obtained in the tank tests differ in several respects from those which have been arrived at by previous investigators, and designers would do well to study them in detail. The differences are too complex for record in a review, but it may be remarked that considerable doubt is thrown upon the standard pressure distribution of a backfill against anchored sheet piling recommended by the Danish Society of Engineers and the suggestions of Mr. R. Stroyer. No finality is claimed for these new conclusions, but on the face of it they deserve very serious consideration.

As to the two practical cases, the first shows very clearly the necessity for extreme precaution in ensuring the tightness of sheet piling (concrete in this case) to retain a sand fill if the latter is to reduce the thrust of a finer material, and the danger of dredging away from the face of such a wall unless such tightness is assured. There is, of course, nothing very novel in this, but the example emphasises the hazards of liquid filling processes. The second case shows that pore pressures may develop to an unexpectedly high degree if consolidation does not progress sufficiently rapidly; the trouble was cured by the use of sand drains.

The problem of contained water and the pressures in it is almost the major one of soil mechanics, and this problem is aggravated in the case, so frequent nowadays, where the filling is placed by pumping. The finer the material, the longer the time required for natural pressure to force out the associated water, and the greater the lateral pressure which the filling exercises upon its boundaries. Terzaghi has shown, over and over again, that the manner in which this water carries the pressure and, as it escapes, transfers the pressure to the grains, is the key to the whole behaviour of alluvial material. When filling is done by pumping, the water content is necessarily high, and only when the material is very coarse does the water escape sufficiently rapidly for it to be of negligible importance in creating pressures.

Designers are strongly recommended to obtain and study this group of papers. H. C.

Reviews—continued

Port Regional Authorities, a Paper by Mr. A. J. Tobin, Executive Director of the Port of New York Authority.

"Vital Speeches of the Day" is an American periodical, published twice monthly, for the purpose of recording important addresses delivered by recognised leaders of public opinion on current problems. The issue for 1st September last contains the report of an address by Mr. Austin J. Tobin, Executive Director of the Port of New York Authority, which cannot fail to be of interest in English as well as in American port circles. The title is "Regional Authorities," with the sub-heading, "The Why and the Wherefor of the Port of New York Authority." It was delivered in May, last year, before an audience in St. Louis in the State of Missouri, a city and port which has certain similarities of setting and environment with those of the leading United States Metropolis. Mr. Tobin called attention to these similarities and advocated treatment of the development problem at St. Louis on the same lines as at New York. It being inappropriate to reproduce the address in full, since it deals with a number of points of purely local interest and value, we must content ourselves with a reference to those features which are of more general importance as illustrating the basic principles on which the Port of New York Authority was founded in 1921.

Mr. Tobin frankly states that "the statutory form and corporate organisation of the Port of New York Authority was modelled largely upon that of The Port of London Authority," with which the use of the term Authority originated in 1908, though the governmental form in the development of the regions round the English ports dates back to 1815. In its proper sense, said Mr. Tobin, the distinguishing marks of a true Authority are:

"1. Its form as an independent corporate agency;
2. Its non-political operation;
3. The self-supporting character of its projects and its reliance upon the revenues of those projects rather than on funds that come directly or indirectly from taxation; and
4. Its adaptability to a regional approach, an aspect which makes it a particularly useful device in the development of inter-state projects."

The success of the Port Authority, he added, had led to the creation, both in the New York region and throughout the United States, of many agencies which used the designation, "Authority." "Some of these are good and some are very bad." The name had been used to clothe an individual with powers and immunities which he could not attain under the statutory forms of local government. When so used, the authority form was simply a dangerous delegation of unfettered and autocratic powers. This abuse of a technical title has not been so marked in Great Britain as in the United States.

Proceeding with his theme, Mr. Tobin went on to explain that the Port of New York Authority consisted of twelve Commissioners, six appointed by each of the Governors of the States of New York and New Jersey, with the advice and consent of the respective Senates. They serve for overlapping terms of six years each and, most important of all, they receive no salaries or compensation whatever. The office of a Commissioner of the Port of New York Authority is considered one of outstanding honour and privilege, and is one of the most highly respected public services in the community. The same ideal of unpaid public service prevails in Great Britain, though a salary is certainly attached to the Chairmanship of the Port of London Authority, which, however, has not invariably been claimed. There can be little doubt that disinterested and unsalaried service on public bodies sets a high standard in this administration, and happily it has proved attractive both in America and Britain to men of distinction in business and the professions. It would be a pity if the tradition of gratuitous public service were abandoned. There is to be noted a regrettable increase in the competition for political office for the sake of the emoluments to be gained. It must inevitably lead to a deterioration in the status as well as in the qualifications of the directorate.

Mr. Tobin concluded his observations on the merits of unpaid public service with these words:

"An Authority of the kind we have in New York and of the kind proposed in St. Louis is a business venture on the scale of any of our large American corporations. At the same time, it is a public corporation of which the stockholders are all of the people of states and counties and cities of the metropolitan region. Its commissioners must be outstanding citizens who have the full confidence of the people and who, at the same time, have the experience and ability to fix the policies and select the staff of a corporation of such size. To set any salary for these positions would detract from the office and would make it more difficult to get the kind of men which the Authority must have."

And this, we imagine, is also the considered judgment of this country. B. C.

Shipping Law, by Lord Chorley, M.A., and O. C. Giles, LL.M. (Sir Isaac Pitman & Sons, Ltd., London, 1947, 343 pp. with appendices and index, 20s.)

The need of a general elementary textbook on Shipping Law has long been felt by students of the subject, and particularly by those embarking upon a commercial rather than a legal career; to these, the technicalities in the numerous more advanced works on the subject present a formidable obstacle. The writers of the present book have kept in mind the needs of those engaged in the business of owning and managing ships, and the three main sections deal with the ship, the running of the ship and marine insurance.

The authors have made no attempt to deal with special controls and regulations: while it is not improbable that some of these have come to stay, they consider that it is too early to deal with such developments which, in any event, are unlikely to change the permanent framework of the law so described in their work.

The Journal of the Institute of Navigation. (John Murray, 6s.; published quarterly.)

The Institute of Navigation, which, it will be remembered, was inaugurated in March, 1947, has now issued the first number of its quarterly magazine, to be known as "The Journal of the Institute of Navigation." The objects of the Journal will be to keep readers informed of the latest technique in connection with the science of air and sea navigation. Full details of the general work of the Institute will be given and contributions dealing with all aspects of navigation will be published.

The latest Radar developments have been given much publicity in the press during recent months, and dock and harbour officials will find the authoritative article on Radio Aids to Navigation, by Sir Robert Watson-Watt, of great interest. Referring to marine radar, especially the PPI set, he states that further provision may take the form of active radar responders identifying such seamarks as light-vessels, which do not readily allow pattern-marking by passive corner reflectors. For the more difficult harbour entrances, the more important ships may well carry an additional PPI set of even shorter wave-length, to give still finer detail and still shorter minimum range without overlay. The regrettable inability of the shipborne set to see round corners reinforces the other familiar considerations leading to the provision of harbour-surveillance PPI sets of the kind now under construction for the Port of Liverpool.

River Tees Improvements.

A report submitted to Stockton-on-Tees Corporation regarding navigation on the River Tees stated that the river was an excellent navigable channel, and with the improvements planned by the Tees Commission below the Tees Newport bridge, the river would be able to deal with the largest ocean-going vessels. It was proposed to provide a dredged channel giving a depth of water 20-ft. below L.W.M.O.S.T., increasing to 30-ft. at the fifth buoy, while above the Tees Newport bridge the depth would be reduced gradually to 10-ft. There would be a depth of about 14-ft. at the Corporation Quay. The report stated that ocean-going vessels would be confined to the lower reaches of the river, but vessels of about 4,000 tons, mostly concerned with Continental trade, would be able to get as far as the Corporation Quay.

Notes of the Month

Fire Float Service on the Tyne.

The Corporation of South Shields and Tynemouth are conferring on the question of the riverside fire float service when it is taken over by South Shields from the National Fire Service on April 1st. The Tyne Improvement Commission are also being asked to share the cost, estimated at about £9,000 a year, less any grant which may be made.

Polish Port Experts Visit Great Britain.

Two Polish port experts, Mr. F. Modrzewski and Mr. W. Szedrowicz, recently arrived in London at the invitation of the British Government. During their stay in this country, they will visit the ports of London, Newcastle, the Mersey and South Wales. Mr. Modrzewski is managing director of the Gdynia and Gdansk port authorities, and Mr. Szedrowicz is a Member of Parliament, deputy chairman of the Parliamentary Maritime Committee and Commissioner for the reconstruction of the Port of Szczecin.

First Harbour with Radar.

The new radar station built to enable the harbour master of Douglas to control by radar all ships entering the port was officially opened on the 27th of last month by the Governor of the Isle of Man. The port claims to be the first in the world to be radar-controlled. The station itself has been built on the Victoria Pier, and the movement of ships within three to four miles will be shown. To direct them to port, a radar set will be used in conjunction with wireless telephony.

Rescue Tug for Brazil.

The tug *Tridente*, of the Brazilian Navy, is now stationed at the Port of Rio Grande for the purpose of rendering assistance to vessels in distress off the Brazilian coast. The *Tridente* is one of three tugs belonging to the "Ata" class, built for the United States Navy during the recent war, for operation in the Pacific. She is propelled by diesel-electric machinery of 1,500 h.p., giving her a speed of 14 knots. She is also equipped with fire fighting appliances and radar, and it is understood that salvage pumps, ordered from the United States, will be installed at some future date. The *Tridente*, which carries a crew of 36, will be on duty at Rio Grande for three months, after which she will be relieved by one of her sister ships.

Graving Dock to be Repaired at the Port of Belfast.

The Belfast Harbour Board have considered a report from the harbour engineer on the condition of the Hamilton Graving Dock. A recent inspection showed that the large stones forming the seats for the keel blocks have been depressed below the level of the surrounding masonry, and, in view of the risk of settlement under ships using the dock, and the already extensive leakage, it was decided that the old masonry down the centre line should be replaced by reinforced concrete slabs. For the time being, only such work as will not interrupt the use of the dock will be undertaken, but later it will be necessary to put it out of commission for about two months.

New Dock on the Great Lakes.

The New York Central and Baltimore & Ohio Railroads recently announced that a modern coal and ore dock will be opened at Toledo in the spring. Situated on Maumee Bay, the docks, which have cost $18,500,000 to construct, will be able to handle 20,000,000 tons of coal and 4,500,000 tons of ore annually. The facility is to be operated by the Lakefront Dock & Railroad Terminal Company, jointly owned by the two railroads, and will be able to serve three coal boats and one ore-carrying vessel simultaneously. Winter mooring for twenty-one vessels will be furnished by slips between and alongside the piers, and, to provide for a manœuvring area between the docks and lake channel, more than 2,500,000 cubic yards of material have been dredged.

Repairs at the Port of Westport, Eire.

The Minister for Industry and Commerce has made a Harbour Works Order which empowers the Westport Port and Harbour Commissioners to reconstruct portions of the quay wall at Westport Harbour.

Dredger Handed over to Turkey.

The British dredger, *Empire Conjuror* (512 tons gross), was transferred to the Turkish flag on February 13th. The vessel, which is to be renamed *Seyhan*, will be employed by the Turkish Ministry of Public Works on dredging operations at the Port of Trebizond.

Slow Discharge at the Port of Istanbul.

Statistics compiled at the Port of Istanbul, Turkey, to show the speed of discharging operations at the port, show that during the period August 1st to November 30th last, 169 foreign vessels called and discharged 109,734 tons of cargo in 699 working days. This works out at an average discharge of 649 tons per steamer and an average rate of discharge of only 157 tons per working day.

Dredging at Port of Wicklow.

Wicklow Harbour is to be dredged by a Dutch firm of contractors. The work should be completed in five or six weeks' time and about 52,000 cubic yards of material will be dredged and dumped in 10 fathoms of water two sea miles from the entrance to the harbour. When this has been done, vessels with a draught of up to 12 feet will be able to enter the harbour at low water. The cost is being met from State funds.

New Polish Port.

Darlowo (formerly Rügenwalde), the new Polish port in Western Pomerania, was inaugurated on January 9th. Like the Port of Ustka, in service since the middle of last year, Darlowo is to be used principally for coal shipments. The coal is brought down to the port by rail and loaded on board by means of conveyor belts, and five or six vessels will be able to load simultaneously. The port can accommodate vessels with a draft of 15-ft.

New Dock for Malta.

The 50,000-ton floating dock which was towed some 4,000 miles from Bombay to Malta in three sections last spring has been joined together, but Malta has no accommodation for it. The only part of the harbour at Valetta in which it can be fully submerged is already occupied by the wreck of the old 30,000-ton floating dock, which was sunk during the war. The removal of this wreck is now to be undertaken by salvage experts, who will utilise pontoon sections of the Mulberry harbours used in the invasion of Normandy. These are to be towed to Malta from Britain this spring, and will be accompanied by a team of expert divers and under-water welders.

Maidens Harbour to be Dredged.

After years of campaigning about the state of their harbour, the fishermen of Maidens, Ayrshire, are hoping it will soon be restored to full use, as there is now a prospect of obtaining from sites at Turnberry Aerodrome 10,000 tons of broken concrete, which will be used to form a second breakwater to lessen the serious siltation in the harbour. Dredging will be required to clear away the silting which has already taken place, and, before agreeing to take over the harbour, the County Council have asked the Scottish Office what sort of grant will be available for rehabilitation work. An official reply is still awaited. Formerly the harbour belonged to the Marquis of Ailsa, who handed it over to the fishermen. During the war, when the younger men were mostly in the navy or employed on other work, silting became an insurmountable problem.

Mechanical Handling Under Difficulties

The construction of a large outfall sewer was recently carried out at Roker, Sunderland, under exceptionally difficult conditions. Some idea of the size of the sewer can be gained from the fact that a man can stand erect inside the pipe, the sections of which weigh 2½ tons each.

As work was only possible during very low tides, an unusual method of handling the sections had to be devised. It was obvious that some form of mobile crane would be necessary, also that it had to be capable of travelling at a reasonably high speed when unloaded, in order to get the maximum number of lifts in the very short time at its disposal. After considerable investigation, it was decided that the Coles Lorry-mounted Crane, fitted with half tracks, would give the necessary manœuvrability combined with maximum lift, derricking and slewing duties.

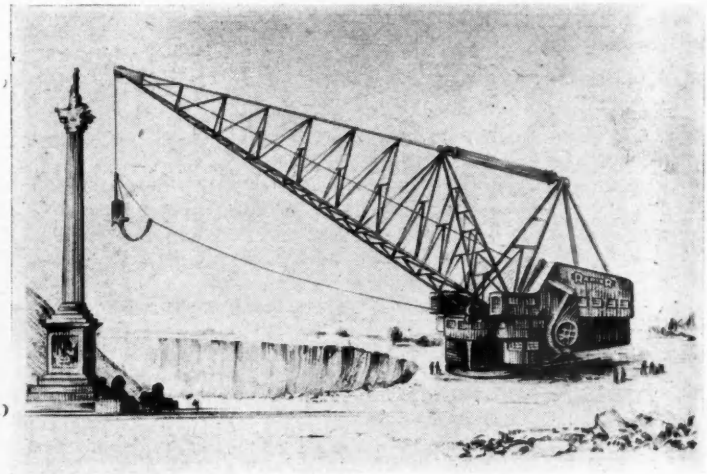
The crane was required to lift half sections of the pipe, placing them accurately into position. Careful alignment being vitally essential, because the sections had then to be jointed with bolts which had to be placed with the greatest accuracy—many of the bolt holes being actually under water.

In order to travel to the working end of the sewer, the crane had to first cross the promenade, then plough through soft sand before reaching the foreshore; here turning round, it proceeded in reverse on to a built-up ramp extending into the sea, and then on to the working end. Most vehicles found the soft sand a considerable obstacle, and one had to be lifted clear by the crane after it had sunk in the sand up to its rear hubs in its efforts to bring a half section up to the job.

The crane was manufactured by Steels Engineering Products, Ltd., Crown Works, Sunderland, England.

The Largest Walking Dragline in the World

An order for what is claimed to be the largest walking dragline in the world has been placed by Messrs. Stewart & Lloyd, Ltd. This giant machine will be used for the efficient winning of ironstone in the open instead of underground, and the following are the main dimensions:—weight, 1,500 tons; bucket size, 20 cu. yds.; boom length, 282 feet. Electric drive by two generator sets, each of 1,500 h.p.



The additional information will also be of interest:—(a) The machine will be in operation for 24 hours each day; (b) the digging and walking controls will be handled by one man; (c) approximately 30 tons of earth will be removed each time the bucket fills; (d) the boom head will be 175 feet above ground level, i.e., higher than Nelson's column; (e) when slewing the boom head will travel at 2,000 feet per minute, i.e., 22½ m.p.h.; (f) the area of the machinery deck will be 4,700 sq. ft., i.e., nearly sufficient for two tennis courts; and (g) the overall length will be 330 feet, i.e., equal to the average football pitch.

The machine, to be known as the Rapier W 1400, is being manufactured by Messrs. Ransomes & Rapier, Ltd., Ipswich, England.

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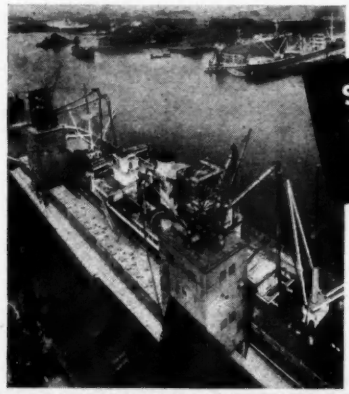

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